JOHN F. KENNEDY SPACE CENTER

NASA TEST REPORT NO. 10814

TESCOM CORPORATION

¼" MOTOR OPERATED REGULATOR

MODEL NO. 269-085

6,000 PSIG SERVICE

22 SEPTEMBER 1964

NASA-K-DE3

TASK ORDER H-110

CONTRACT NO. NAS8-2483

NASA TEST REPORT NO. 10814

TESCOM 1/4 INCH MOTOR OPERATED REGULATOR

MODEL NO. 269-085

6,000 PSIG SERVICE

0 TO 5000 PSIG OUTLET PRESSURE

18 AUGUST 1964

NASA-K-DE3

TASK ORDER H-110

CONTRACT NO. NAS8-2483

NASA TEST REPORT NO. 10814

HAYES PROJECT NO. 530P4

NASA TASK ORDER NO. H-110 CONTRACT NO. NAS8-2483

HAYES PERSONNEL

PREPARED BY B.E. Bain DATE 28 August 1964

CHECKED BY W L Smith DATE 18 September 1964

APPROVED BY [signature] DATE 18 Sept 64

APPROVED BY A E Hand DATE 22 Sept '64

NASA PERSONNEL

CHECKED BY H.B. Ford DATE 10-12-64

APPROVED BY J.S. Kunkle DATE 1 Dec. 1964

APPROVED BY R H Mackall DATE 5 Dec 1964

PREFACE

This report is a presentation of the results obtained from tests conducted on three $\frac{1}{4}$ inch motor operated regulators (Model No. 269-085) manufactured by the Tescom Corporation.

This report is presented in two sections, an "A" section which contains the test results and a "B" section which contains the Test Procedure.

All tests were conducted in the high pressure test facility at Hayes International Corporation, Birmingham, Alabama, under Contract No. NAS8-2483.

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SUMMARY

Three Tescom Motor-Operated Regulators, Model No. 269-085 (Serial No. 's -001, -002, and -005), were subjected to a receiving inspection, an operational test, pneumatic proof test, pneumatic cycle test, pneumatic surge test, temperature susceptibility test, and a pneumatic functional test.

The receiving inspection revealed that the three components were sufficiently packaged to prevent damage and contamination.

Results from the 6000 PSIG operational test indicate that as the inlet pressure was reduced from 6000 PSIG to 5100 PSIG the outlet pressure was also reduced from 50 to 190 PSIG below its initial value of 5000 PSIG. Beyond this point a decrease in inlet pressure produces a corresponding decrease in outlet pressure.

No leakage, internal or external, was encountered during the operational test.

With the relief valve properly adjusted, the average overshoot pressure was 192 PSIG. The average undershoot pressure was 34 PSIG (overshoot pressure being pressure increase over set pressure before vent valve bleeds excess pressure; undershoot pressure being pressure decrease before regulators senses the pressure drop and actuates to replenish pressure.

As the relief valve adjustment was changed more than a quarter turn in either direction, the regulator would not function properly.

The pneumatic proof test revealed that specimens -001 and -002 leaked at 10,000 and 12,000 PSIG. The leakage was through the vent port. Specimen -005 did not leak during the test. There was no damage to the specimens during the proof test.

The results of the pneumatic flow test are revealed in the Flow Characteristic Curve presented in Figure A4, on Page A13.

The pneumatic cycle test revealed that the opening current varied from 390 to 520 M. A. for the various units. All specimens indicated need for lubrication when the current requirements increased above normal values.

The operational characteristics of the specimens were unchanged after 1,000 cycles.

The Sensor back up ring in specimen -005 was found to be slightly extruded after 285 cycles. The back up ring was trimmed and reinstalled and testing resumed.

After 928 cycles, the bearing and upper end of the adjusting stem on specimen -001 was found to be in need of lubrication. The bearing and adjusting screw were galled so that the bearing had seized on the adjusting screw.

After 348 cycles, specimen -002 ceased functioning properly. Inspection revealed that the adjusting screw, bearing cap and thrust bearing were damaged. The bearing from specimen -005 was used in specimen -002 for the remainder of the test.

Specimen -002 leaked internally at a rate of 15 SCIM after 1,000 cycles. There was no leakage from the other specimens during the test.

The pneumatic surge test revealed that the operating characteristics of the specimens were unchanged by instantaneous applications of pressures up to 6,000 PSIG.

The temperature susceptibility test revealed that specimen -005 worked normally during the test.

Specimen -001 functioned normally during the hot (+165°F) portion of the test, but during the cold (-60°F) portion it leaked internally at 6000 PSIG.

Specimen -002 also functioned normally during the hot (+165°F) portion of the test, but became inoperable with 2000 PSIG pressure applied during the cold (-60°F) portion of the test. The spring was found to be deformed and the connector pin was found to be locked in the inlet seat retainer plug.

The spring, seats, and retainer were replaced and the unit operated normally below 6000 PSIG. At 6000 PSIG, there was a slight leak out the vent port. The bubbles appeared too fast to be counted but the leakage rate could not be detected with a 0 - 13 SCIM range flowmeter.

The pneumatic functional test was conducted using a 0 - 500 PSIG spring and sensor assembly installed in the -001 specimen.

This test revealed that when the inlet pressure was reduced to zero PSIG and then increased to 6000 PSIG, the output pressure of the specimen returned each time to within one PSIG of its original setting.

When the inlet pressure was reduced from 6000 to 3800 PSIG, the outlet pressure increased from 125 PSIG to 145 PSIG each time.

Refer to Figure A5, Page A14 for characteristics of the component when the motor operator was replaced with a conventional control knob and the component was operated at 750 PSIG inlet pressure.

TEST SUMMARY SHEET
TESCOM $\frac{1}{4}$ IN. MOTOR OPERATED REGULATOR
MODEL 269-085
S/N-001,-002, and 005

TEST	UNIT OR UNITS	OPERATIONAL BOUNDARY	TEST OBJECTIVE	TEST RESULTS	REMARKS
OPERATIONAL	-001, -002, -005	Pressurize specimen inlet to 6,000 PSIG, set outlet to 5,000 PSIG, then reduce inlet pressure incrementally to zero PSIG.	Determine effect on outlet pressure of component as inlet pressure is incrementally decreased while maintaining initial specimen outsetting.	Satisfactory	During inlet pressure decay, regulated outlet pressures of specimens decreased as inlet pressures were incrementally decreased.
		At various outlet pressure settings increase outlet pressure until specimen relief valve functions.	To determine component performance under working conditions.		The specimens overshoot pressure values averaged 192 PSIG.
		Leak check at pressure up to 6,000 PSIG in 1,000 PSIG increments.	Check internal and external leakage.		No leakage from specimens.
PNEUMATIC PROOF	-001, -002, -005	Pneumatically pressurize to 12,000 PSIG and check for leakage.	To determine structural integrity of the component.	Satisfactory	Specimens structurally capable of withstanding proof pressures.
PNEUMATIC FLOW TEST	-001	Flow at 6000 PSIG inlet	To determine components flow capabilities.	Satisfactory	See Figure No. A4 for Flow characteristics Curve.

TEST SUMMARY SHEET
TESCOM $\frac{1}{4}$ IN. MOTOR OPERATED REGULATOR
MODEL 269-085
S/N-001,-002, and 005

TEST	UNIT OR UNITS	OPERATIONAL BOUNDARY	TEST OBJECTIVE	TEST RESULTS	REMARKS
PNEUMATIC CYCLE	-001, -002, -005	Fully open and fully close at inlet pressure of 6,000 PSIG.	To determine the effect of usage on the sealing and operational characteristics of the component.	Satisfactory. Adjustment screw had to be lubricated after each 300 cycles to keep operating current from becoming excessive.	-005 Slight extrusion of "O" Ring (sensor) after 285 cycles. "O" Ring trimmed and test continued through 1000 cycles. -001 Bearing and adjustment screw galled after 928 cycles. Lubed and test continued. Unit -002 ceased functioning properly after 348 cycles. Bearing and adjustment screw had to be replaced and test continued through 1000 cycles.
PNEUMATIC SURGE	-001, -002, -005	Suddenly pressurize the specimen with pressure to 6,000 PSIG.	To determine the effect of sudden pressurization on the sealing characteristics of the component.	Satisfactory	Operation not affected by surging.

TEST SUMMARY SHEET
TESCOM $\frac{1}{4}$ IN. MOTOR OPERATED REGULATOR
MODEL 269-085
S/N-001,-002, and 005

TEST	UNIT OR UNITS	OPERATIONAL BOUNDARY	TEST OBJECTIVE	TEST RESULTS	REMARKS
TEMPERATURE SUSCEPTIBILITY	-001, -002, -005	Pressurize specimens to 6,000 PSIG in 2,000 PSIG increments at extreme temperatures (approx. -60°F & 165°F)	To determine the effect of environmental temperature extremes on the sealing and operational characteristics of the component.	Satisfactory	All units operated normally during hot portion of test. Unit -005 only unit operating normally during cold portion of test. Unit -002 and unit -001 leaked during cold test. In each case leakage stopped at approximately -40°F. Leakage was past main seat in each Case.

TEST SUMMARY SHEET
TESCOM ¼ IN. MOTOR OPERATED REGULATOR
MODEL 269-085
S/N-001,-002, and 005

TEST	UNIT OR UNITS	OPERATIONAL BOUNDARY	TEST OBJECTIVE	TEST RESULTS	REMARKS
PNEUMATIC FUNCTIONAL	-001,	Place 0-500 spring and sensor assy. in specimen. Increase inlet pressure to 6000 PSIG and set outlet to 125 PSIG. Reduce inlet pressure to zero and raise to 6000 PSIG 50 times.	Check outlet repeatability characteristics of components when inlet pressure is removed and then reapplied.	Satisfactory	Specimen outlet pressure returned to 125 PSIG 49 out of 50 times (126 PSIG remaining time)
		Increase inlet pressure to 6000 PSIG and regulate outlet pressure to 125 PSIG. Reduce inlet pressure to 3800 PSIG.	Determine outlet pressure characteristics when inlet pressure reduced.		Outlet pressure increased to 145 PSIG when inlet pressure reduced from 6000 to 3800 PSIG.
	-002 -005	Place 0-500 spring and sensor assy in specimens. Replace motor operator with control knob. Pressurize inlet to 750 PSIG. Turn knob in "Increase" direction.	Determine outlet pressure corresponding to each turn of knob.		See curve presented on Page A14.

PURPOSE

The purpose of these tests was as follows:

1. Determine if the test component performs satisfactorily at normal operating pressure.
2. Determine the structural integrity of the test component.
3. Determine the flow characteristics of the test component.
4. Determine if the sealing and operational characteristics of the test component are affected by:
   a. usage
   b. sudden pressurization
   c. environmental temperature extremes

COMPONENT DESCRIPTION

I. GENERAL

A. Nomenclature: Motor Operated Regulator

B. Manufacturer: Tescom Corporation

C. Manufacturer's Model No.: 269-085

D. Manufacturer's Serial No.: -001, -002, -005

E. See Figures A1 and A2 for photographs of the test specimen.

II. FUNCTIONAL CHARACTERISTICS

A. Operating Pressure

Rated Inlet: 10,000 PSIG Max. (Note: Qualified for 6000 PSIG Operating Pressure)
Rated Outlet: 6,000 PSIG Max. (unit set at 5000 PSIG)

B. Proof Pressure: 200% of maximum pressure

C. Burst Pressure: 400% of maximum pressure

D. Working Medium: Dry air, nitrogen, or helium

E. Operating Temperature Range: -65°F to 165°F

F. Electrical Requirements: 28 VDC Nominal 1.0 Amp Max.

III. CONSTRUCTION

A. Body Material: 316 Stainless Steel

B. Bonnet Material: 316 Stainless Steel

C. Actuator Cover: 304 Stainless Steel

D. Springs: 302 Cor. Res. Steel

E. Bearing: 440 Cor. Res. Steel

F. All other metallic parts: 303 Stainless Steel

G. Seats: Kel-F

H. Back-up rings: Buna-N

I. "O"-Rings: Buna-N and Teflon Coated Buna-N.

DISCUSSION OF RESULTS

RECEIVING INSPECTION

An inspection of the specimens in the "as received" condition revealed that each was sealed in a polyethylene bag and packed in a cardboard box. There was no evidence of contamination or damage to the specimens, and they appeared to be ready for testing. See Page B6 for detailed results of the receiving inspection.

OPERATIONAL TEST

The results of this test (See page B9 for test procedure) revealed that for each test specimen (S/N -001, -002, and -005) the operating current requirement varied from approximately 250 to 500 M. A. When the regulated output pressure of the specimens was set at 5000 PSIG and the inlet pressure was decreased from 6000 to zero PSIG in 50 PSIG increments, the stabilized outlet pressures of each specimen corresponding to each incremental inlet change were very similar. The general tendency was for the pressure drop across the specimen to decrease fairly uniformly, with slight fluctuation in the lower pressure range, from 1000 PSIG to zero PSIG. Most of the pressure drop decrease occurred by the time an inlet pressure of 5100 PSIG was reached.

Specimen -005 functioned erratically each time the inlet pressure was decreased. The outlet pressure would rise in 100 PSIG surges. Disassembly revealed that the connector and seat retainer had stuck together. The spring was also worn and bent. The spring, connector pin, seat retainer and seat were replaced.

When the test specimens were set to regulate a given outlet pressure and then the outlet pressures were increased above this point until the re-

lief valves in the specimens functioned, the over shoot pressure values of the specimens were determined. These values averaged 192 PSIG above the set regulated output settings of the specimens. The -005 specimen failed to relieve initially and when the outlet setting was exceeded by 550 PSIG, the motor, gearbox, and cover were blown off. The unit was repaired and operation was continued in a normal manner.

As the downstream pressure was decreased the average undershoot pressure was 34 PSIG.

During this test, the specimens failed to function properly when the relief valve adjusting screw was turned more than 1/4 turn clockwise or counter clockwise from its normal setting.

There was no internal or external leakage from the specimens at pressures of 1000 to 6000 PSIG.

PNEUMATIC PROOF TEST

The results of this test (See Page B14 for test procedure) show that the -001 and -002 specimens leaked slightly at the vent port when pressurized to 10,000 PSIG and above. The leakage was too great to count bubbles and too small to determine with a flowmeter. The -005 specimen did not leak during the test. There was no structural damage to the specimens during this test.

PNEUMATIC FLOW TEST

From the data obtained during this test (See Page B15 for test procedure) a characteristic flow curve was plotted and is presented on Page A13.

PNEUMATIC CYCLE TEST

The results of this test (See Page B16 for test procedure) show that when

pressurized to 6000 PSIG, the current requirement needed to open the test specimens varied from 390 to 520 M. A. Several times during the cycling of the specimens, the opening current requirement would increase somewhat above the normal requirements. After lubricating the adjusting screw, thrust bearing and other moving parts the current requirements were reduced to normal.

The basic operational characteristics of the specimens remained unchanged during the test. No leakage was encountered under cycling condition by specimens -001 and -005. The -002 specimen, however, leaked internally at a rate of 15 SCIM. This leakage was noted during leakage check at 1000 cycles.

Some damage occurred to each of the three test specimens during this test. The back-up ring in the sensor of specimen -005 was found to be slightly extruded after 285 cycles. The feathered edge was removed, and the backup ring was placed back into the specimen. The spring in the -002 specimen was found to be slightly warped and seemed to be rubbing on the regulator housing. After 348 cycles the -002 specimen "locked-up", and the current requirement increased to 1.5 Amp. Disassembly revealed that the adjusting screw, bearing cap, and thrust bearing, were damaged. Inspection revealed that the bearing was probably defective when originally installed. The thrust bearing from specimen -005 was used in specimen -002 for the remainder of the test. The thrust bearing became locked on the load adjusting screw of specimen -001 after 928 cycles. The bearing and the upper end of the load screw required lubrication.

PNEUMATIC SURGE TEST

The results of this test (See Page B18 for test procedure) show that the surge peak pressures occurring when pressures of 2000, 3000, 4000, 5000 and 6000 PSIG were instantaneously applied to the specimens were 2150, 3450,

5550 and 6900 PSIG respectively for specimen -001; 2150, 3300, 4400, 5500, and 6650 PSIG respectively for specimen -002; and 2100, 3300, 4650, 5750, and 6900 PSIG respectively for specimen -005.

Each specimen withstood the surge pressures to which it was subjected without any change in operational characteristics, any damage, or any leakage.

TEMPERATURE SUSCEPTIBILITY TEST

The results of this test (See Page B53 for test results) show that specimen -005 functioned normally throughout its operating pressure range when subjected to extremely hot and cold temperatures (approximately 165°F and -65°F). There was no leakage from this specimen during the test.

Specimen -001 performed normally during the hot portion of the test without any signs of damage or leakage. However, when subjected to cold (-65°F) temperature extremes, internal leakage began at 4500 PSIG but stopped after component was operated a couple of times. The specimen was operated at 6000 PSIG and the outlet pressure (pre set at 5000 PSIG) overshot to 6000 PSIG. Considerable internal leakage occurred at 6000 PSIG. As the temperature was increased leakage stopped and specimen operated normally at -40°F.

Specimen -002 performed normally during the hot portion of the test without any signs of damage or leakage. When subjected to cold temperature extremes and a pressure of 2000 PSIG the specimen ceased functioning properly. Disassembly revealed that the spring was deformed and the connector pin was locked in the inlet seat retainer. The spring, the seats, and the retainer were replaced, and the specimens operated normally until a pressure of 6000 PSIG was applied. A slow leak out the vent port occurred at this time. The leakage was too great to count bubbles and too slight to measure with a flowmeter.

PNEUMATIC FUNCTIONAL TEST

The first part of this test was performed only on the -001 specimen. A 0-500 PSIG spring and sensor assembly was installed in the test specimen, the inlet was pressurized to 6000 PSIG, and the regulated output pressure of the specimen was set at 125 PSIG. When the inlet pressure was reduced to zero PSIG and then reapplied, the specimen outlet pressure returned to 125 PSIG 49 out of 50 times and to 126 PSIG the remaining time.

Inlet pressure was set at 6000 PSIG. With the regulated output pressure set at 125 PSIG, the inlet pressure reduced to 3800 PSIG. This operation was repeated 10 times. The output pressure of the specimen increased to 145 PSIG each time the pressure was reduced from 6000 PSIG to 3800 PSIG.

The second portion of this test was performed on the -002 and -005 specimens. The motor operators were removed from the specimens and were replaced with Tescom Corporation Control Knobs. A 0-500 PSIG spring and sensor assembly was installed in each specimen, and each specimen inlet was pressurized to 750 PSIG. Each specimen control knob was rotated in the "INCREASE" direction 12 full turns. After each full turn the outlet pressure of each specimen was determined. A curve was prepared showing the number of turns of the control knob plotted against the corresponding outlet pressure reading of the specimens and appears on Page A14.

See Pages A15 and A17 for the test data from this test.

CONCLUSIONS

Results from tests conducted on the three test specimens lead to the following conclusions:

1. The component is capable of operating at a working pressure of 6000 PSIG.
2. The component is structurally sound.
3. The component can be expected to withstand 1000 cycles at working pressure without damage. The component should be lubricated or checked for needed lubrication every two-hundred cycles or whenever the operating current requirement shows a sudden increase.
4. The component can be expected to operate properly at temperatures up to 165°F but at low temperatures (approximately -65°F) some leakage might be encountered. At -40°F (approximately) the leakage problems are not encountered.

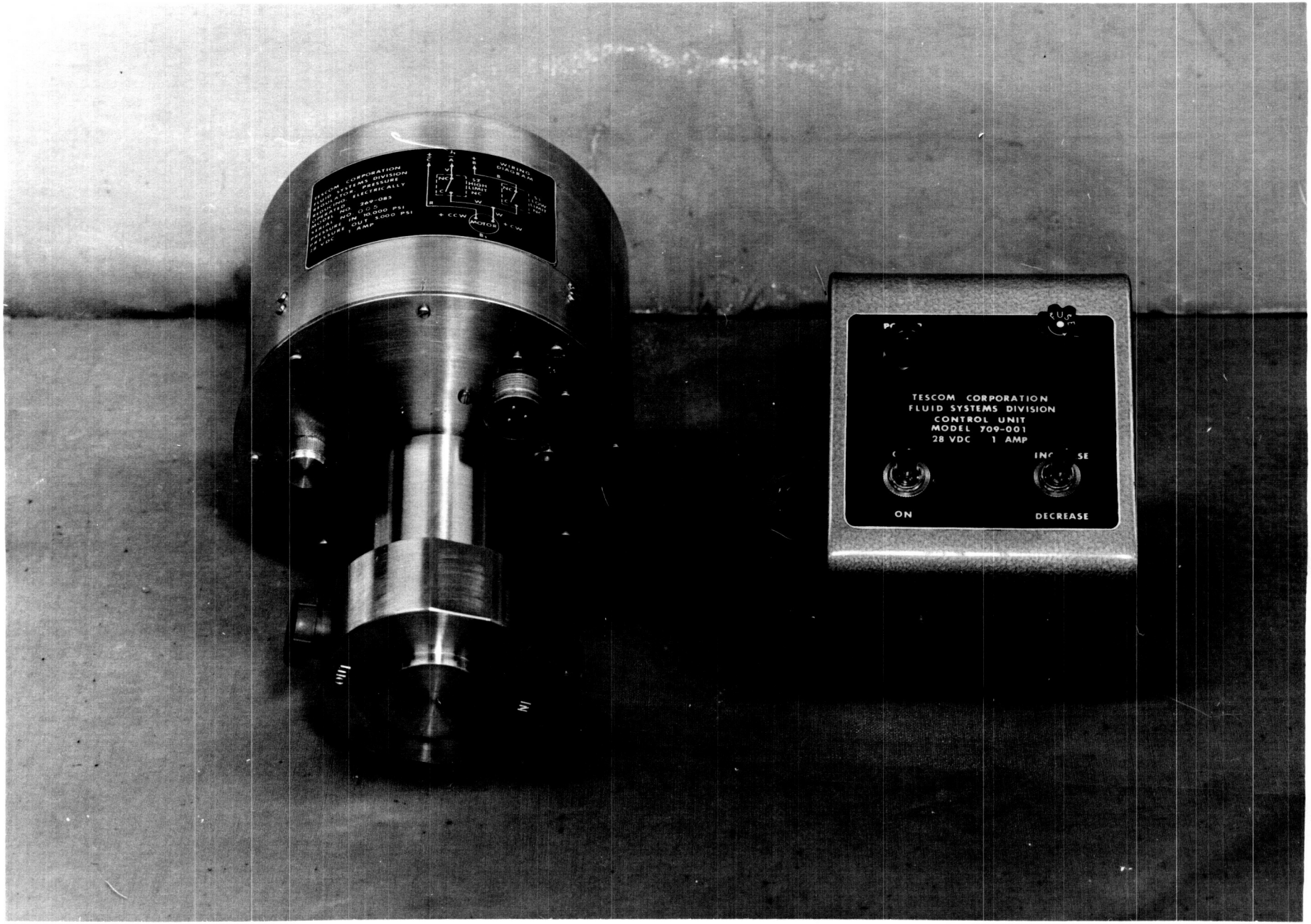

FIGURE A1. PHOTOGRAPH OF TESCOM 1/4 INCH MOTOR OPERATED REGULATOR, MODEL NO. 269-085.

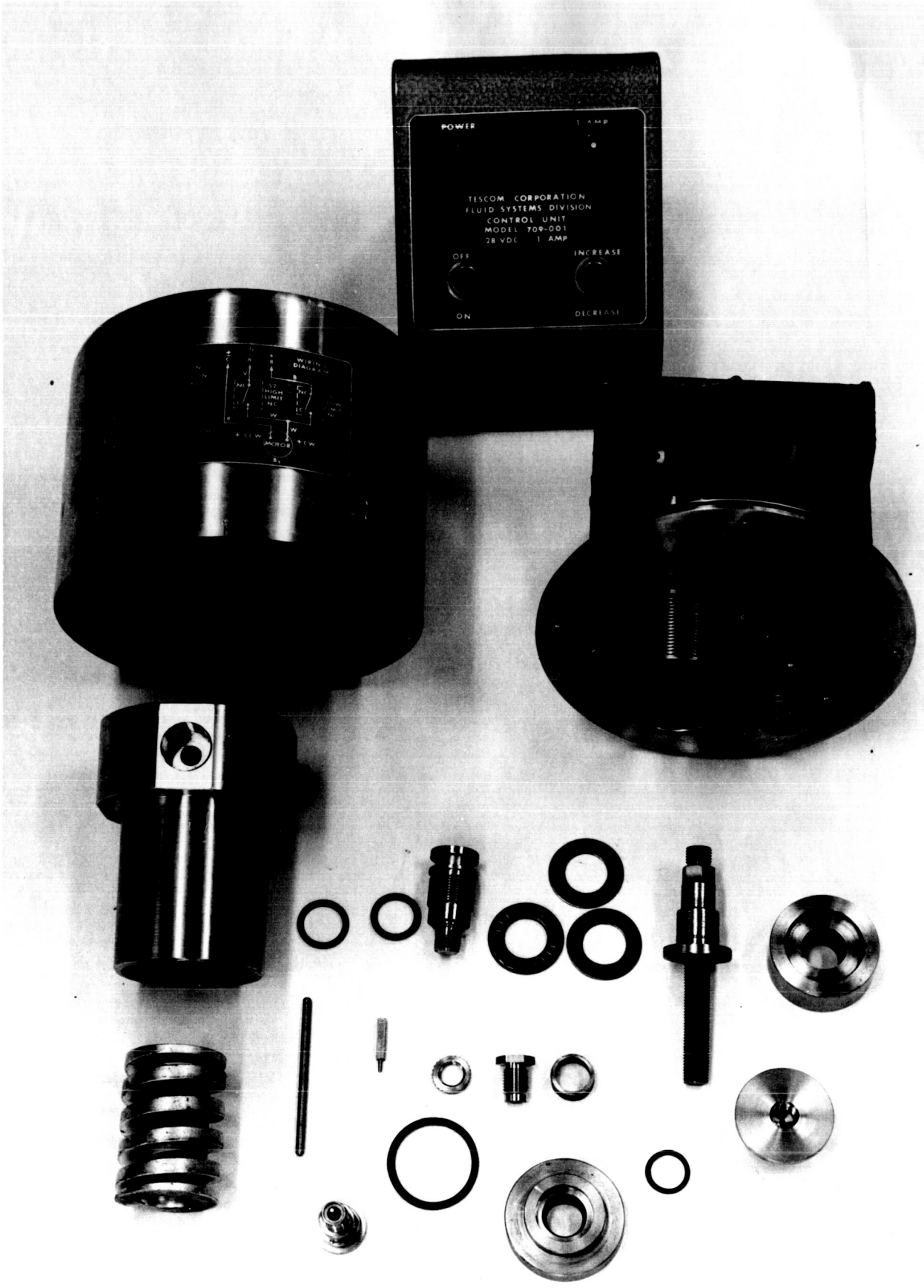

FIGURE A2 PHOTOGRAPH OF DISASSEMBLED TESCOM 1/4 INCH MOTOR OPERATED REGULATOR

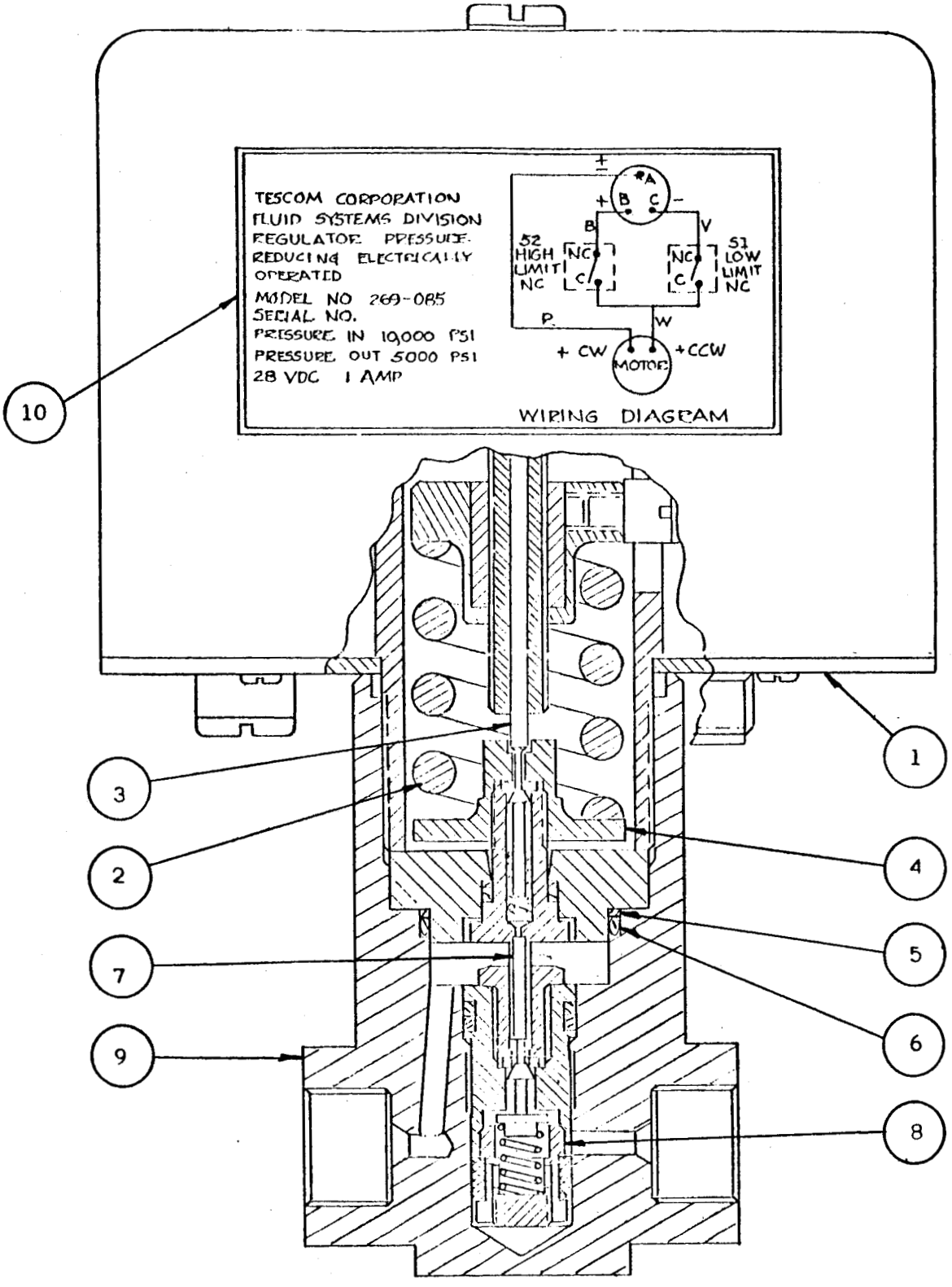

FIGURE A3. SECTIONAL VIEW OF TESCOM MOTOR OPERATED REGULATOR (SHEET 1 OF 2).

PARTS LIST

ITEM NO.	DESCRIPTION	MATERIAL
1	Actuator Assembly	---
2	Spring, Load	302 SST
3	Rod, Relief	303 SST
4	Sensor Assembly	---
5	Ring, Back-up	Teflon
6	O-Ring	Buna N
7	Connector	303 SST
8	Valve Assembly	---
9	Body	316 SST
10	Data Plate	---

FIGURE A3. SECTIONAL VIEW OF TESCOM MOTOR OPERATED REGULATOR (SHEET 2 OF 2).

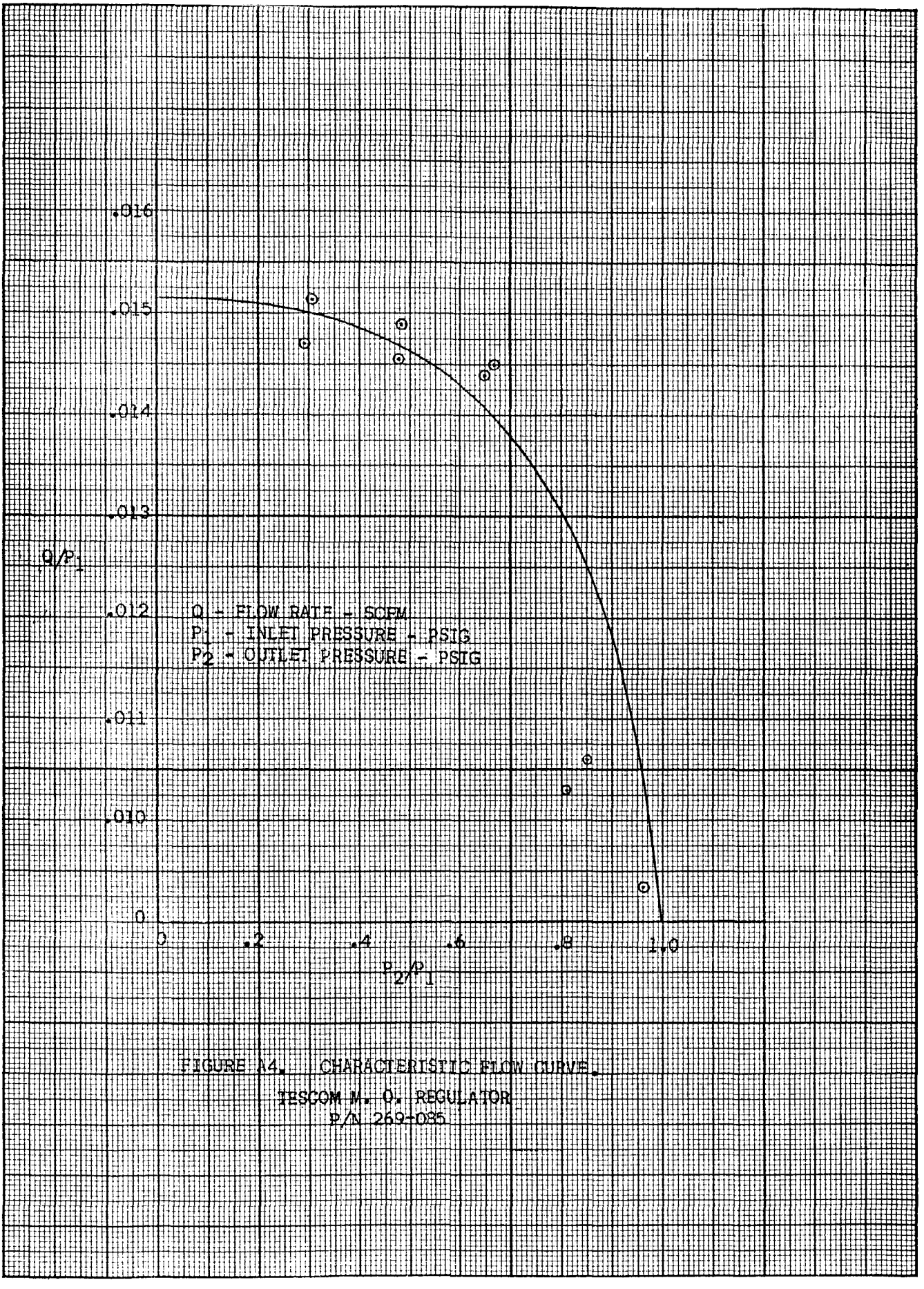

FIGURE A4. CHARACTERISTIC FLOW CURVE.
TESCOM M. O. REGULATOR
P/N 269-035

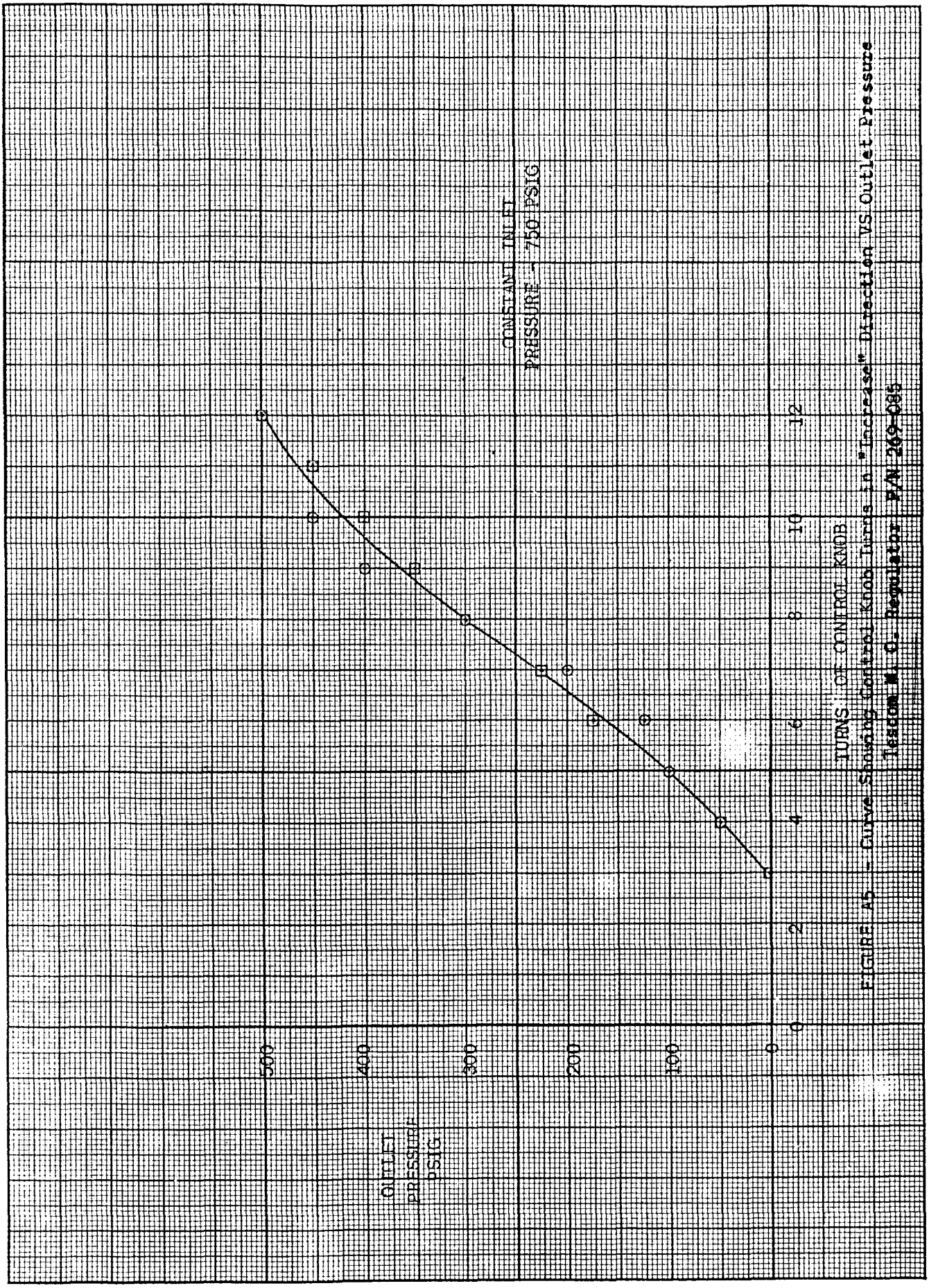

FIGURE A5 - Curve Showing Control Knob Turns in "Increase" Direction VS Outlet Pressure
Tescom W. C. Regulator P/N 269-036

TEST DATA SHEET

PNEUMATIC FUNCTIONAL TEST
TESCOM MOTOR OPERATED REGULATOR

PART I
(USING SPECIMEN -001 WITH 0-500 PSIG SPRING AND SENSOR ASSY. INSTALLED)

CYCLES	INLET PRESSURE PSIG	OUTLET PRESSURE PSIG	CYCLES	INLET PRESSURE PSIG	OUTLET PRESSURE PSIG
1	6,000	125	26	6,000	125
2	↑	↑	27	↑	↑
3	↑	↑	28	↑	↑
4	↑	↑	29	↑	↑
5	↑	↑	30	↑	↑
6	↑	↑	31	↑	↑
7	↑	↑	32	↑	↑
8	↑	↑	33	↑	↑
9	↑	↑	34	↑	↑
10	↑	↑	35	↑	↑
11	↑	125	36	↑	↑
12	↑	126	37	↑	↑
13	↑	125	38	↑	↑
14	↑	↓	39	↑	↑
15	↑	↓	40	↑	↑
16	↑	↓	41	↑	↑
17	↑	↓	42	↑	↑
18	↑	↓	43	↑	↑
19	↑	↓	44	↑	↑
20	↑	↓	45	↑	↑
21	↑	↓	46	↑	↑
22	↑	↓	47	↑	↑
23	↑	↓	48	↑	↑
24	↑	↓	49	↑	↑
25	6,000	125	50	6,000	125

BY W. R. Cook

TEST DATA SHEET
PNEUMATIC FUNCTIONAL TEST
TESCOM MOTOR OPERATED REGULATOR

PART I (Cont'd)
(USING SPECIMEN -001 WITH 0-500 PSIG SPRING AND SENSOR ASSY. INSTALLED)

CYCLES	INLET PRESSURE, PSIG	INLET PRESSURE REDUCED TO PSIG	OUTLET PRESSURE, PSIG
	6,000		125
1		3,800	145
	6,000		
2		3,800	
3			
4			
5			
6			
7			
8			
9			
10	6,000	3,800	145

BY W. R. Cook

TEST DATA SHEET
PNEUMATIC FUNCTIONAL TEST
TESCOM MOTOR OPERATED REGULATOR

PART II
(USING SPECIMEN -002 AND -005 WITH 0-500 PSIG SPRING AND SENSOR ASSY. INSTALLED)

INLET PRESSURE PSIG	CONTROL KNOB TURNS IN INCREASE DIRECTION	SPECIMEN -002 OUTLET PRESSURE, PSIG	SPECIMEN -005 OUTLET PRESSURE, PSIG
750	1	0	0
↑	2	0	0
	3	0	0
	4	50	50
	5	100	100
	6	125	175
	7	200	225
	8	300	300
	9	400	350
	10	450	400
↓	11	450	450
750	12	500	500

BY H. R. Cook

TEST PROCEDURE, MOTOR OPERATED REGULATOR

SK-P4-14

HAYES PERSONNEL

PREPARED BY J. E Kelley DATE 12-Nov. 1963

CHECKED BY J.W. Falkenberry DATE 15-Nov.-1963

APPROVED BY W.M. Ward DATE 22 NOV-63

APPROVED BY A. E. Hand DATE 3 Dec 63

NASA PERSONNEL

CHECKED BY H. B. Ford DATE 10-12-63

APPROVED BY J. S. Kimble DATE 10 Dec. 1963

APPROVED BY R H Mackall DATE 12 Dec 1963

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PURPOSE: The purpose of these tests is to determine if the test specimen will function properly while under simulated operating conditions.

I. GENERAL INSTRUCTIONS

1.1 SAFETY

1.1.1 The Test Engineer shall inspect all test setups, and shall be responsible for the safety of personnel and equipment while tests are being conducted.

1.1.2 Under no circumstances are lines to be disconnected while under pressure.

1.2 EQUIPMENT

1.2.1 A list of all equipment used during the test, including date of last calibration and accuracy of each, shall be attached to this Test Procedure.

1.2.2 Precaution shall be exercised to keep the test system clean at all times. Protect disconnected lines, open ports, etc., from contamination by covering with aluminum foil. Prior to installing the test specimen in the test fixture, purge all parts of the system that have been disconnected.

1.3 OPERATIONS

1.3.1 Each operation in this Test Procedure shall be completed and signed by the technician performing the operation.

1.3.2 Pressure readings shall be made with calibrated gages unless otherwise specified. Gage accuracy to be $\frac{1}{4}$ of 1% of full scale.

1.3.3 Temperature measurements shall be made with thermocouples.

1.3.4 External leakage shall be determined with a leak detector solution unless otherwise specified.

1.3.5 Internal leakage shall be measured with a flowmeter unless otherwise specified.

1.3.6 All main lines shall be capable of flowing the amount of gas required of the test specimen.

1.4 RECORDS

1.4.1 Complete records of all test operations shall be maintained.

1.4.2 All pertinent information obtained during testing shall be entered on the Data Sheets provided in this Test Procedure, or written on a separate sheet and attached to this Test Procedure.

1.5 FAILURES

1.5.1 Failures shall be reported to the Test Engineer immediately.

1.6 RETESTING

1.6.1 Retesting shall be done at the discretion of the Test Engineer to prove the reliability of data obtained.

1.6.2 Reliability of data shall be the responsibility of the contractor.

1.6.3 Retesting at the request of the customer can be negotiated.

1.7 DEVIATIONS

1.7.1 Deviations from the requirements shall be accomplished only after approval from the NASA Monitoring Agency.

1.8 REPORTS

1.8.1 An Engineering Test Report shall be prepared and submitted to the customer upon completion of testing.

1.9 DISPOSITION

1.9.1 The specimen, with all spare parts, shall be reassembled and packaged for shipment to NASA. Shipping instructions will be furnished by the NASA Monitoring Agency.

II. RECEIVING INSPECTION

2.1 PACKAGING

The component should have been packaged to prevent damage and contamination during shipment. All other packaging, packing, and shipment marking should have been in accordance with Interstate Commerce Commission Rules.

2.1.1 Date of receipt in test area. 2/17/64.

2.1.2 Describe type and condition of packaging used. Units sealed in polyethylene bags and packed in cardboard boxes.

2.1.3 How were ports sealed? complete unit sealed in polyethylene bag.

2.1.4 Record any evidence of contamination. None.

2.1.5 Record any evidence of damage. If no detectable damage occurred, so state. No damage.

2.1.6 Type of port: Grayloc____, Aminco X, ASA____, Other____.

2.2 CERTIFICATIONS OR OTHER INFORMATION

2.2.1 LOX cleaning certification enclosed? Yes____ Dated____. No X.

2.2.2 Specification to which component was cleaned. None.

2.2.3 Functional test certification enclosed? Yes____ No X.

2.2.4 Proof test certification enclosed? Yes____ No X.

2.2.5 Certified outline drawing enclosed? Yes_____ No __X__.

2.2.6 Parts breakdown list enclosed and the material for each part identified? Yes_____ No __X__.

2.3 DECAL OR NAMEPLATE INFORMATION

Manufacturer's Name and Address

Tescom Corporation

27th Avenue & 4th Street S.E.

Minneapolis 14, Minnesota

*Regulator Control Unit

Cure Date X

Date Inspected 5/19/64

NASA No.

Part No.

Model No. *709-001 269-085

Serial No. 005

Pressure In 10000 Out 5000

Service

Assembly Date X

2.3.1 How identified?

NAMEPLATE_____ DECAL_____

DIE STAMP_____ ETCHED_____

METAL TAG_____ OTHER Metal Cal.

2.3.2 Flow direction marked by an arrow? Yes_____ No X.

2.3.3 Inlet and outlet connections marked? Yes X No_____.

2.3.4 Working pressure of specimen marked? Yes X No_____.

2.3.5 Outlet pressure range marked? Yes X. No_____.

2.3.6 Electrical connections marked? Yes X. No_____.

2.3.7 Operational voltage marked? Yes X. No_____.

2.4 GENERAL INFORMATION

2.4.1 Inspect and record condition of all visible threads. Visibly good.

2.4.2 Check overall dimensions for conformance to those on the outline drawing. List deviations on a copy of the specimen drawing. No drawing this Date 5/19/64

2.4.3 Check body materials for conformance to those on the outline drawing. List deviations on a copy of the parts list drawing.

2.4.4 Assembled weight of component. 9.25 lb.

2.4.5 Photograph assembled component, include nameplate. Photograph No. 2 6492 3. Date 8/11/64.

2.4.6 Upon completion of incoming inspection, store specimen in a suitable location until required for the evaluation test.

INSPECTED BY H. R. Cook DATE 5/19/64

H. R. Cook

III. TEST PROCEDURE

3.1 OPERATIONAL TEST

The purpose of the Operational Test is to determine if the test specimen performs satisfactorily at operating pressure.

3.1.1 Arrange the Operational Test setup according to Figure No. 1, Page No. B24. Ascertain that all valves and regulators are closed.

3.1.2 Pressurize the system, by adjusting regulator No. 1, until gage No. 6 indicates 6,000 PSIG.

3.1.3 Move "OFF-ON" switch No. 4 to the "ON" position. Move toggle switch No. 5 in the "INCREASE" direction and hold until the test specimen opens completely. Monitor ammeter No. 8 and record opening current on Data Sheet No. 1, Page No. B31.

3.1.4 After the test specimen opens, move toggle switch No. 5 to the "NEUTRAL" position and read downstream pressure on gage No. 7. Record findings on Data Sheet No. 1, Page No. B31.

3.1.5 Monitor gage No. 7 for 5 minutes. Record any change in pressure occurring during the 5 minute period, on Data Sheet No. 1, Page No. B31.

3.1.6 Close the test specimen by moving toggle switch No. 5 in the "DECREASE" direction. Monitor ammeter No. 8 and record current reading on Data Sheet No. 1, Page No. B31.

3.1.7 After the test specimen closes, move toggle switch No. 5 to the "NEUTRAL" position. Read downstream pressure on gage No. 7 and record findings on Data Sheet No. 1, Page No. B31.

3.1.8 If gage No. 7 does not indicate zero PSI, open valve No. 2 and allow the system to vent. After the system vents, close valve No. 2.

3.1.9 Open the test specimen fully open by moving toggle switch No. 5 to the "INCREASE" position. After the test specimen opens completely, move toggle switch No. 5 to the "NEUTRAL" position. Read outlet pressure on gage No. 7 and record findings on Data Sheet No. 1, Page No. B31.

3.1.10 Decrease the inlet pressure to zero in 50 PSIG increments, by adjusting regulator No. 1. At each 50 PSIG increment, read outlet pressure on gage No. 7. Record findings on Data Sheet No. 1, Page No. B31.

3.1.11 Close the test specimen fully closed by moving toggle switch No. 5 to the "DECREASE" position. After the specimen closes, move toggle switch No. 5 to the "NEUTRAL" position.

3.1.12 Pressurize the system to 6,000 PSIG by adjusting regulator No. 1

3.1.13 Move toggle switch No. 5 to the "INCREASE" position until gage No. 7 reads 1,250 PSIG, then move toggle switch No. 5 to the "NEUTRAL" position.

3.1.14 Open valve No. 2 slightly and allow a small flow to vent.

3.1.15 Monitor gage No. 7. Record the pressure at which gage No. 7 stabilizes on Data Sheet No. 2, Page No. B35.

3.1.16 Close valve No. 2.

3.1.17 Adjust regulator No. 3 until gage No. 7 begins to rise. Continue adjusting regulator No. 3 until the pressure indicated on gage No. 7 stabilizes. Record the pressure at which gage No. 7 stabilizes on Data Sheet No. 2, Page No. B 35.

3.1.18 Close regulator No. 3.

3.1.19 Move toggle switch No. 5 to the "INCREASE" position until gage No. 7 indicates 2,500 PSIG, then move toggle switch No. 5 to the "NEUTRAL" position. Repeat operations 3.1.14 through 3.1.18.

3.1.20 Move toggle switch No. 5 to the "INCREASE" position until gage No. 7 indicates 3,750 PSIG, then move toggle switch No. 5 to the "NEUTRAL" position. Repeat operations 3.1.14 through 3.1.18.

3.1.21 Move toggle switch No. 5 to the "INCREASE" position until gage No. 7 indicates 5,000 PSIG, then move toggle switch No. 5 to the "NEUTRAL" position. Repeat operations 3.1.14 through 3.1.18.

3.1.22 Close regulator No.1 and open valve No. 2. After the system vents, close valve No. 2.

3.1.23 Turn the relief valve adjustment screw clockwise until it "bottoms out". Count the number of turns and record on Data Sheet No. 2, Page No. B 35. Repeat operations 3.1.12 through 3.1.22.

3.1.24 Turn the relief valve adjustment screw counter-clockwise

for the full travel of the screw. Count the number of turns and record on Data Sheet No. 2, Page No. B35. Repeat operations 3.1.12 through 3.1.22.

3.1.25 Turn the relief valve adjustment screw clockwise to the manufacturer's setting. The number of clockwise turns will be the difference between the number of counter-clockwise turns obtained in operation 3.1.24 and the number of clockwise turns obtained in operation 3.1.23.

3.1.26 Remove the orifice at the outlet of valve No. 2.

3.1.27 Move toggle switch No. 5 to the "DECREASE" position and hold until the test specimen closes completely. After the specimen closes, move toggle switch No. 5 to the "NEUTRAL" position.

3.1.28 Pressurize the system to 1,000 PSIG, by adjusting regulator No. 1.

3.1.29 Check for internal leakage by monitoring gage No. 7 for a rise in pressure. If no appreciable rise in pressure can be detected, attach a flowmeter to the outlet of valve No. 2, open valve No. 2, and determine internal leakage. Record findings on Data Sheet No. 2, Page No. B32.

3.1.30 Close valve No. 2 and remove the flowmeter.

3.1.31 Open the test specimen full open by moving toggle switch No. 5 to the "INCREASE" position and holding for several seconds.

3.1.32 Check the test specimen for external leakage with a leak detector solution. Record findings on Data Sheet No. 2, Page No. B 32.

3.1.33 Close the test specimen by moving toggle switch No. 5 to the "DECREASE" position and holding for several seconds.

3.1.34 Open valve No. 2 and allow the system to vent. After the system vents, close valve No. 2.

3.1.35 Pressurize the system to 6,000 PSIG in increments of 1,000 PSIG, by adjusting regulator No. 1. Repeat operations 3.1.29 through 3.1.34 for each increment of pressure.

3.1.36 Depressurize the system by closing regulator No. 1 and opening valve No. 2.

3.2 PNEUMATIC PROOF TEST

The purpose of the Pneumatic Proof Test is to determine the structural integrity of the test specimen.

3.2.1 Arrange the Pneumatic Proof Test setup according to Figure No. 2, Page No. B25. Ascertain that all valves are closed.

3.2.2 Move "OFF-ON" switch No. 4 to the "ON" position. Open the test specimen fully open by moving toggle switch No. 5 in the "INCREASE" direction. After the specimen opens, move toggle switch No. 5 to the "NEUTRAL" position.

3.2.3 Pressurize the system, by adjusting regulator No. 1, until gage No. 3 indicates 2,000 PSIG.

3.2.4 Check for leakage by watching for bubbles in the water. Record findings on Data Sheet No. 3, Page No. B39.

3.2.5 Adjust the inlet pressure in 2,000 PSIG increments to a maximum of 12,000 PSIG. Repeat operation 3.2.4 for each increment of pressure.

3.2.6 Disassemble, inspect and clean the test specimen with a trichloroethylene solution.

3.2.7 Record ease of disassembly on Data Sheet No. 3, Page No. B39.

3.2.8 Record condition of test specimen on Data Sheet No. 3, Page No. B39.

3.2.9 Photograph the test specimen with parts arranged in an exploded view. Record photograph No. and date on Data Sheet No. 3, Page No. B39.

3.2.10 Reassemble the test specimen. Record ease of reassembly on Data Sheet No. 3, Page No. B39.

3.3 PNEUMATIC FLOW TEST

The purpose of the Pneumatic Flow Test is to determine if the test specimen will meet the flow requirements and to evaluate the resulting effects.

3.3.1 Arrange the Pneumatic Flow Test setup according to Figure No. 3, Page No. B26. Ascertain that all valves and regulators are closed.

3.3.2 Regulate the specimen supply pressure to 6,000 PSIG by adjusting regulator No. 1. Record the pressure at the outlet of regulator No. 1 on Data Sheet No. 4, Page No. B42.

3.3.3 Move "OFF-ON" switch No. 4 to the "ON" position. Open the test specimen fully open by moving toggle switch No. 5 in the "INCREASE" position. After the test specimen opens completely, move toggle switch No. 5 to the "NEUTRAL" position.

3.3.4 Open valve No. 6 full open. Make certain that flowmeter No. 7, transducers No. 8, No. 9, No. 10, and thermocouples No. 11, and No. 12 are properly connected to the oscillograph recorder.

3.3.5 Energize the oscillograph starter switch and solenoid valve No. 2.

3.3.6 After a steady flow has been established, de-energize the oscillograph starter switch and solenoid valve No. 2. Record event No. on Data Sheet No. 4, Page No. B42.

3.3.7 Repeat operations 3.3.2 through 3.3.6 for 3 more complete runs with valve No. 6, 3/4, 1/2, and 1/4 open.

3.3.8 Depressurize the system by closing regulator No. 1.

3.4 PNEUMATIC CYCLE TEST

The purpose of the Pneumatic Cycle Test is to determine the effects of usage on the sealing and operational characteristics of the test specimen.

3.4.1 Arrange the Pneumatic Cycle Test setup according to Figure No. 4, Page No. B27. Ascertain that all valves and regulators are closed. Do not connect flowmeter No. 3.

3.4.2 Move "OFF-ON" switch No. 4 to the "ON" position.

3.4.3 Pressurize the system to 6,000 PSIG by adjusting regulator No. 1.

3.4.4 Check for internal leakage by monitoring gage No. 8 for a rise in pressure. If no appreciable rise in pressure is indicated, attach flowmeter No. 3 to the outlet of valve No. 2, open valve No. 2, and determine internal leakage. Check the test specimen's body temperature. Record findings on Data Sheet No. 5, Page No. B43.

3.4.5 Close valve No. 2 and remove flowmeter No. 3.

3.4.6 Move toggle switch No. 5 in the "INCREASE" direction and hold until the test specimen is fully open. Monitor ammeter No. 6 and determine opening current. Record findings on Data Sheet No. 5, Page No. B43.

3.4.7 After the test specimen is fully open, move toggle switch No. 5 to the "NEUTRAL" position. Perform the following operations and record all findings on Data Sheet No. 5, Page No. B43.

3.4.7.1 Read upstream pressure on gage No. 7.

3.4.7.2 Read downstream pressure on gage No. 8.

3.4.7.3 Determine external leakage with a leak detector solution.

3.4.8 Open valve No. 2 and begin moving toggle switch No. 5 from the "INCREASE" position to the "DECREASE" position for 1,000 cycles. One cycle consists of moving toggle switch No. 5 from the "INCREASE" position to the "DECREASE" position and back to the "INCREASE" position. Allow the test specimen to open completely while in the "INCREASE" position and to close completely while in the "DECREASE" position. After every 200 cycles, move toggle switch No. 5 in the "DECREASE" direction and hold until the test specimen closes then move toggle switch No. 5 to the "NEUTRAL" position. Close valve No. 2 and repeat operations 3.4.4 through 3.4.7.

3.4.9 Depressurize the system by closing regulator No. 1 and opening valve No. 9 and No. 2.

3.5 PNEUMATIC SURGE TEST

The purpose of the Pneumatic Surge Test is to determine if sudden pressurization will damage the test specimen and/or affect its sealing characteristics.

3.5.1 Arrange the Pneumatic Surge Test setup according to Figure No. 5, Page No. B28. Ascertain that all valves and regulators are closed. Do not connect flowmeter No. 6.

3.5.2 Move "OFF-ON" switch No. 4 to the "ON" position.

3.5.3 Ascertain that the test specimen is closed by moving toggle switch No. 5 to the "DECREASE" position and holding for several seconds. After the specimen closes, move toggle switch No. 5 to the "NEUTRAL" position.

3.5.4 Pressurize the system to 2,000 PSIG by adjusting regulator No. 1.

3.5.5 Energize the oscillograph starter switch and solenoid valve No. 2.

3.5.6 De-energize the oscillograph starter switch and record event No. on Data Sheet No. 6, Page No. B48.

3.5.7 Check for internal leakage by monitoring gage No. 8 for a rise in pressure. If no appreciable rise in pressure can be detected, attach flowmeter No. 6 to the outlet of valve No. 3, open valve No. 3, and determine internal leakage. Record findings on Data Sheet No. 6, Page No. B48.

3.5.8 Close valve No. 3 and remove flowmeter No. 6.

3.5.9 Move toggle switch No. 5 in the "INCREASE" direction and hold until the test specimen opens completely.

3.5.10 After the test specimen opens completely, move toggle switch No. 5 to the "NEUTRAL" position and perform the following operations. Record findings on Data Sheet No. 6, Page No. B48.

3.5.10.1 Read upstream pressure on gage No. 7.

3.5.10.2 Read downstream pressure on gage No. 8.

3.5.10.3 Determine external leakage with a leak detector solution.

3.5.10.4 Read the test specimen's body temperature.

3.5.11 De-energize solenoid valve No. 2, and move toggle switch No. 5 to the "DECREASE" position and hold until the test specimen closes completely. After the test specimen closes, move toggle switch No. 5 to the "NEUTRAL" position.

3.5.12 Open valves No. 3 and No. 9 and allow the system to vent. After the system vents, close valves No. 3 and No. 9.

3.5.13 Pressurize the system to 6,000 PSIG in 1,000 PSIG increments, by adjusting regulator No. 1. Repeat operations 3.5.5 through 3.5.12 for each increment of pressure.

3.5.14 Depressurize the system by closing regulator No. 1, energizing solenoid valve No. 2, opening valves No. 3 and No. 9, and holding toggle switch No. 6 in the "INCREASE" position for several seconds.

3.6 TEMPERATURE SUSCEPTIBILITY TEST

The purpose of the Temperature Susceptibility Test is to to determine the effects of environmental temperature extremes on the sealing and operational characteristics of the test specimen.

3.6.1 Arrange the Temperature Susceptibility Test setup according to Figure No. 6, Page No. B29. Ascertain that all valves and regulators are closed. Do not connect the flowmeter.

3.6.2 Set the thermal switch on Fenwal thermostat No. 13 to break contact at -65°F.

3.6.3 Adjust regulator No. 9 until gage No. 10 indicates 75 PSIG.

3.6.4 Open solenoid valve No. 8 by moving switch No. 16 to the "ON" position.

3.6.5 Slowly open valve No. 11 until a steady flow of gaseous nitrogen enters the thermal chamber.

3.6.6 Allow the test specimen's body temperature to reach -65°F and to remain at -65°F for 30 minutes.

3.6.7 Move "OFF-ON" switch No. 4 to the "ON" position.

3.6.8 Fully open valve No. 3 and pressurize the system, by adjusting regulator No. 1, until gage No. 6 indicates 2,000 PSIG.

3.6.9 Perform the following operations and record findings on Data Sheet No. 7, Page No. B51.

3.6.9.1 Read the test specimen and thermal chamber temperatures.

3.6.9.2 Monitor gage No. 7 for an indication of excessive internal leakage. If no rise in temperature can be detected, attach a flowmeter to the outlet of valve No. 2, open valve No. 2 and determine internal leakage.

3.6.9.3 Close valve No. 2 and disconnect the flowmeter.

3.6.9.4 Move toggle switch No. 5 to the "INCREASE" position and hold until the test specimen opens completely. After the test specimen opens, move toggle switch No. 5 to the "NEUTRAL" position.

3.6.9.5 Close valve No. 3 and monitor gages No. 6 and No. 7 for a decrease in pressure. Monitor gages No. 6 and No. 7 for 5 minutes and record any change in pressure on Data Sheet No. 7, Page No. B51.

3.6.9.6 Move toggle switch No. 5 to the "DECREASE" position and hold until the test specimen closes completely. After the test specimen closes, move toggle switch No. 5 to the "NEUTRAL" position.

3.6.9.7 Open valve No. 2 and allow the system to vent. After the system vents, close valve No. 2.

3.6.10 Fully open valve No. 3.

3.6.11 Pressurize the system, by adjusting regulator No. 1, to 6,000 PSIG in 1,000 PSIG increments. Repeat operations 3.6.9 through 3.6.9.7 for each increment of pressure.

3.6.12 Move toggle switch No. 5 from the "DECREASE" position to the "INCREASE" position and back to the "DECREASE" position. Allow the test specimen to fully open while in the "INCREASE" position and to fully close while in the "DECREASE" position. After the 10th cycle, open valve No. 2 and allow the system to vent. After the system vents, close valve No. 2 and repeat operations 3.6.9 through 3.6.9.7.

3.6.13 Close regulator No. 1 and open valves No. 2 and No. 3. Move toggle switch No. 5 to the "INCREASE" position and hold until the system vents. After the system vents, move toggle switch No. 5 to the "NEUTRAL" position and close valves No. 2 and No. 3.

3.6.14 Fully close valve No. 11 and regulator No. 9. Move switch No. 14 to the "OFF" position.

3.6.15 Open the thermal chamber and allow the test specimen to return to room temperature.

3.6.16 Close the thermal chamber and set the thermal switch on Fenwal thermostat No. 13 to break contact at +165°F.

3.6.17 Adjust regulator No. 9 until gage No. 10 indicates 75 PSIG.

3.6.18 Open solenoid valve No. 8 by moving switch No. 16 to the "ON" position.

3.6.19 Slowly open valve No. 15 until a steady flow of hot air enters the thermal chamber.

3.6.20 Allow the test specimen's body temperature to reach +165°F and to remain at +165°F for 30 minutes.

3.6.21 Repeat operations 3.6.7 through 3.6.13.

3.6.22 Fully close valve No. 15 and regulator No. 9. Move switch No. 16 to the "OFF" position.

APPENDIX NO. 1

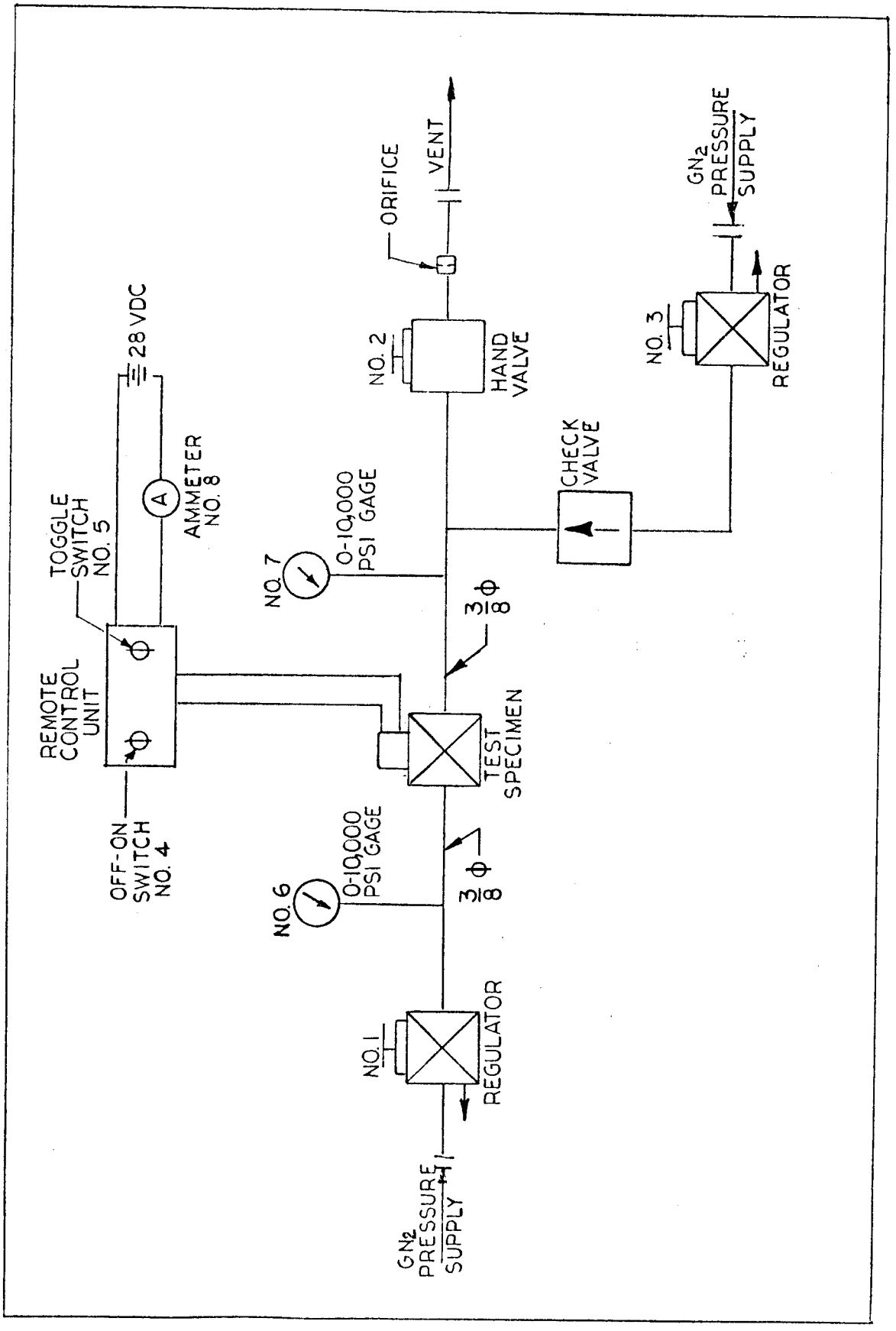

FIGURE NO. 1 SCHEMATIC FOR OPERATIONAL TEST

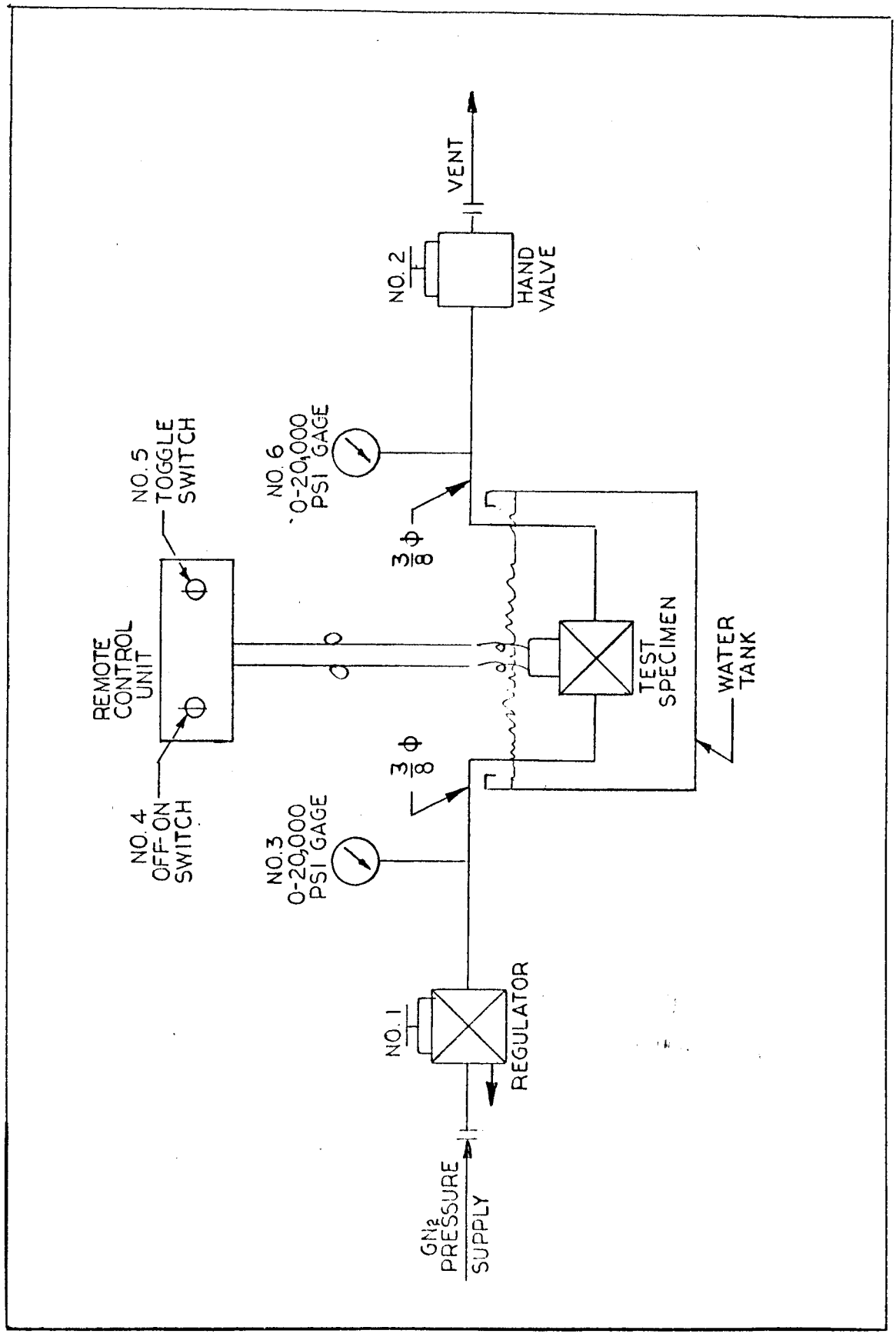

FIGURE NO. 2 SCHEMATIC FOR PNEUMATIC PROOF TEST

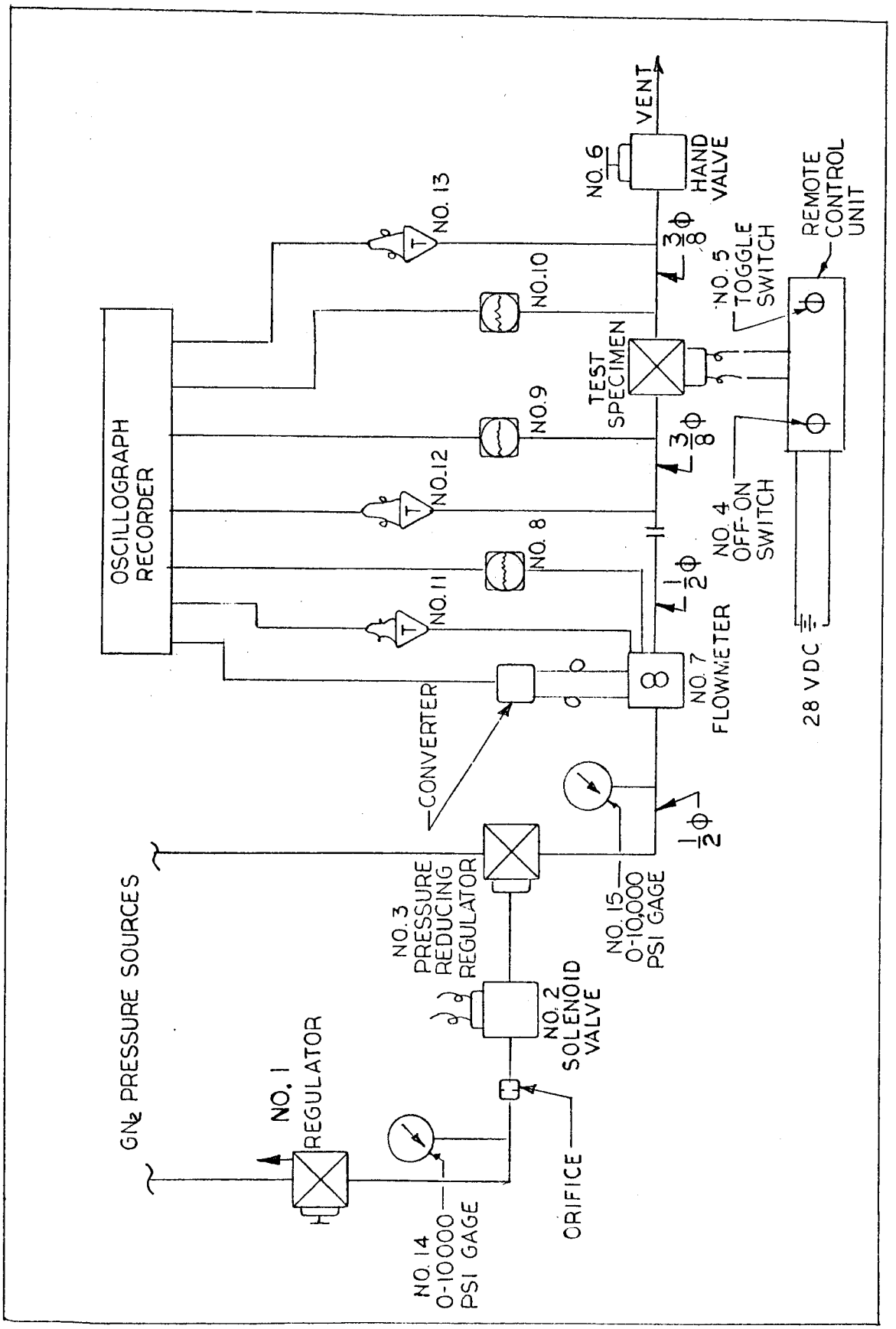

FIGURE NO. 3 SCHEMATIC FOR PNEUMATIC FLOW TEST

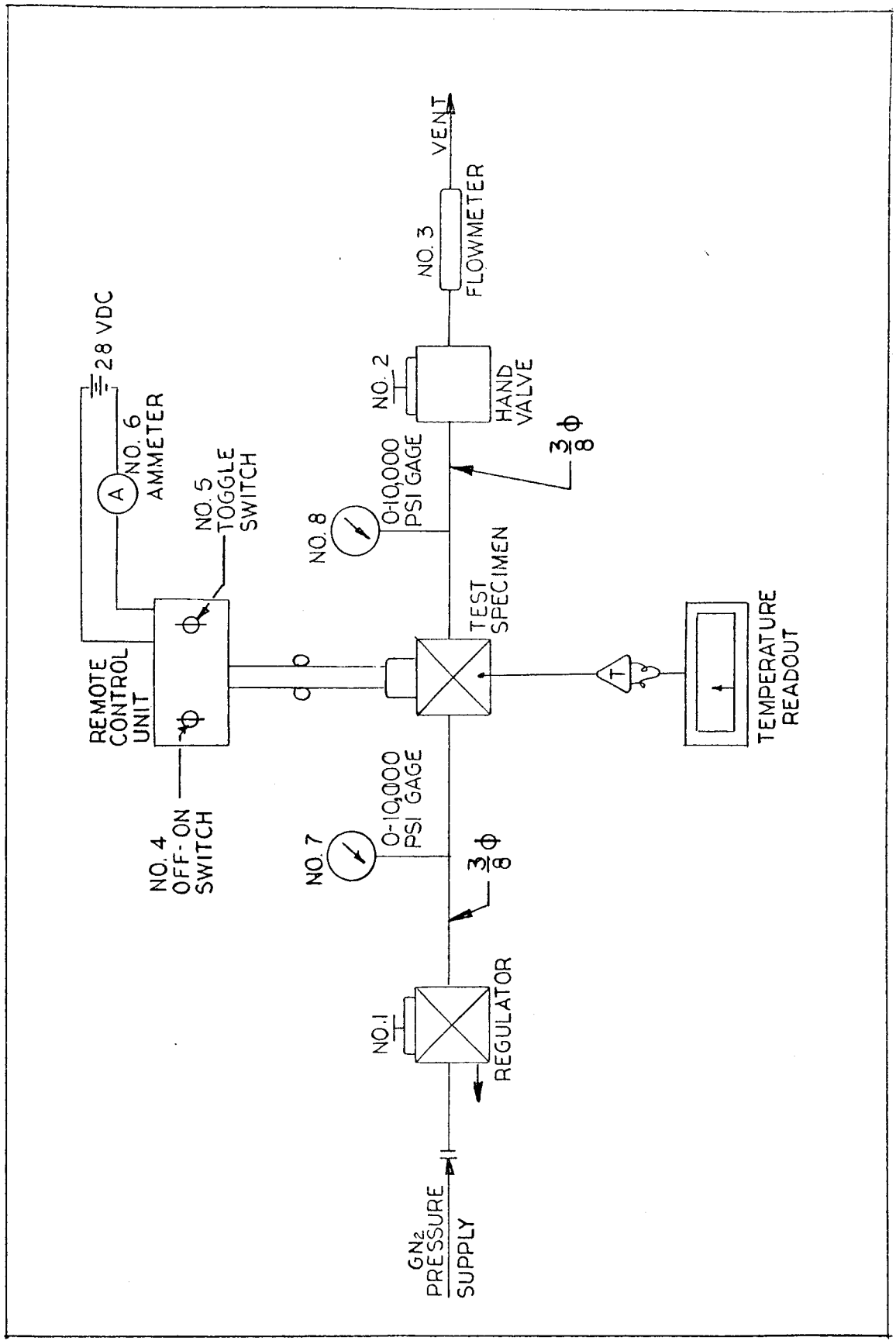

FIGURE NO. 4 SCHEMATIC FOR PNEUMATIC CYCLE TEST

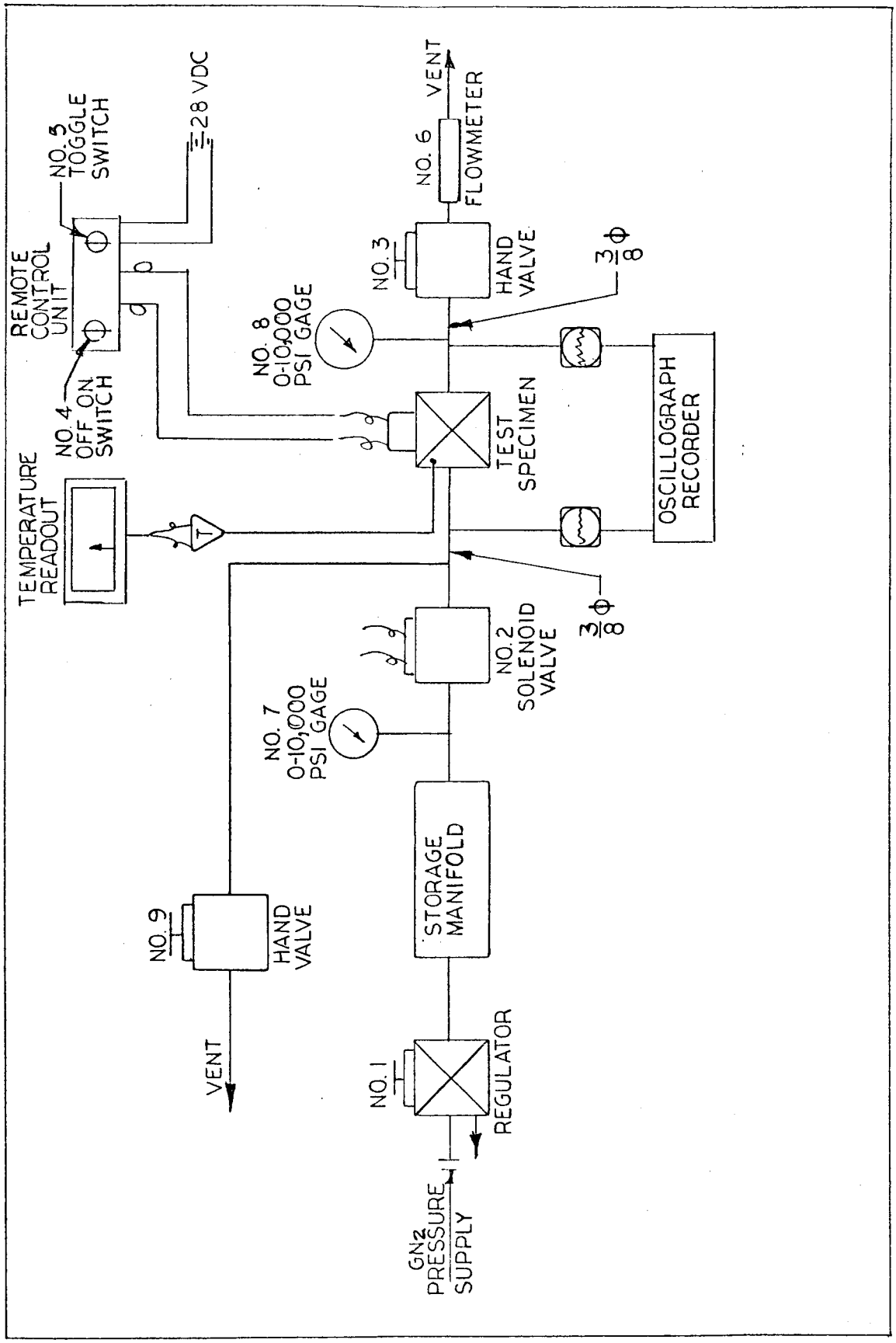

FIGURE NO.5 SCHEMATIC FOR PNEUMATIC SURGE TEST

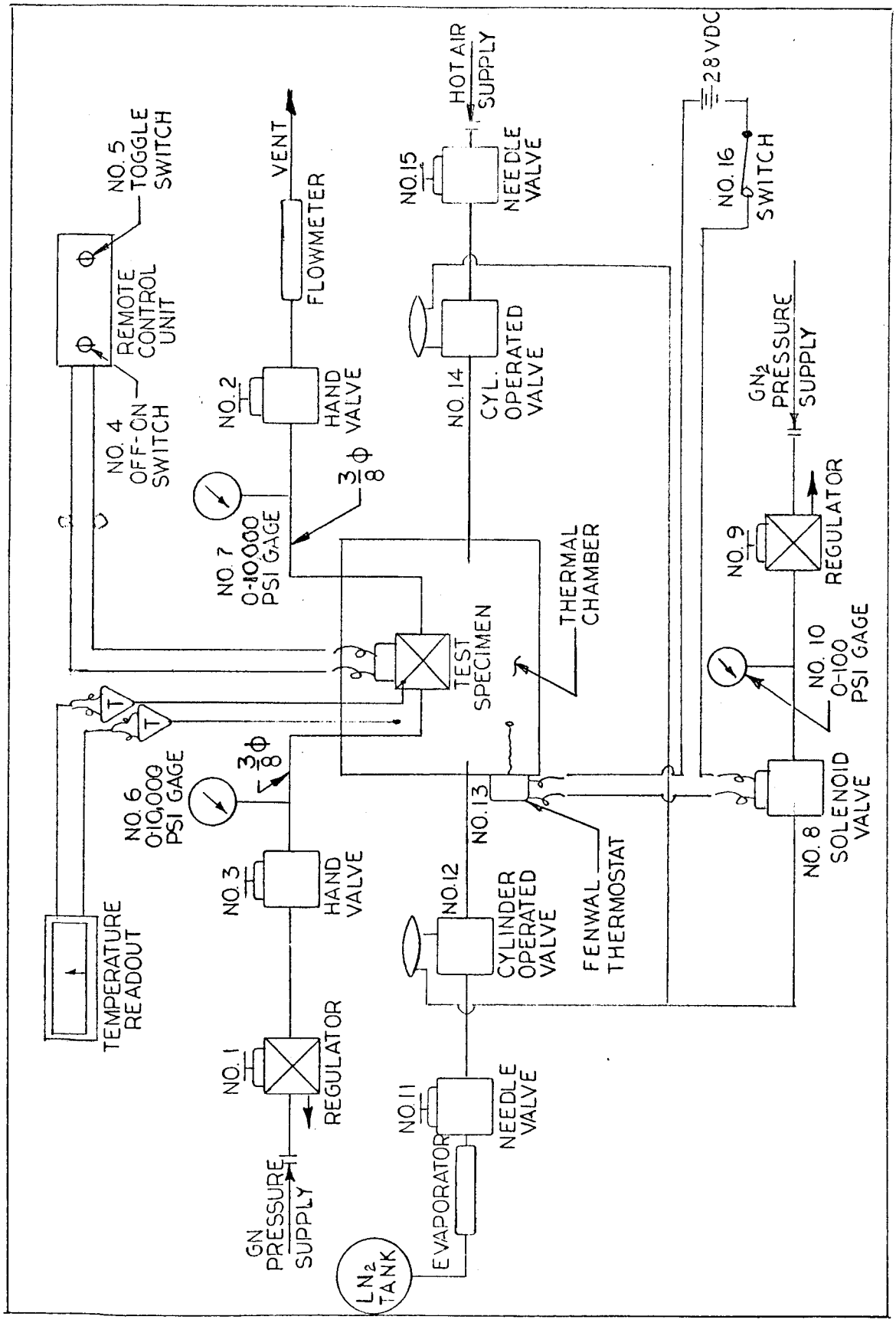

FIGURE NO.6 SCHEMATIC FOR TEMPERATURE SUSCEPTIBILITY TEST

APPENDIX NO. 2

DATE SHEET NO. PAGE

TEST DATA SHEET NO. 1

MOTOR OPERATED REGULATOR

3.1 OPERATIONAL TEST (COMPONENT S/N-001)

3.1.3 OPENING CURRENT min. 240 - max. 500 M.A. 3.1.4 DOWNSTREAM PRESSURE 5000 PSI 3.1.5 PRESSURE CHANGE 190 PSI

3.1.6 CLOSING CURRENT max. 380 - min. 250 M.A. 3.1.7 DOWNSTREAM PRESSURE (SPECIMEN CLOSED) Zero

3.1.9 INLET PRESSURE VERSUS OUTLET PRESSURE

3.1.10												
	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET
	6,000	5,000	5,000	4,805	4,000	3,930	3,000	2,930	2,000	1,930	1,000	920
	5,950	4,900	4,950	4,805	3,950	3,870	2,950	2,870	1,950	1,870	950	880
	5,900	4,850	4,900	4,805	3,900	3,800	2,900	2,830	1,900	1,820	900	820
	5,850	4,830	4,850	4,800	3,850	3,760	2,850	2,780	1,850	1,770	850	770
	5,800	4,820	4,800	4,770	3,800	3,720	2,800	2,730	1,800	1,730	800	720
	5,750	4,810	4,750	4,720	3,750	3,670	2,750	2,680	1,750	1,680	750	680
	5,700	4,810	4,700	4,660	3,700	3,620	2,700	2,620	1,700	1,630	700	630
	5,650	4,810	4,650	4,580	3,650	3,530	2,650	2,570	1,650	1,580	650	580
	5,600	4,810	4,600	4,550	3,600	3,480	2,600	2,520	1,600	1,530	600	530
	5,500	4,810	4,550	4,500	3,550	3,440	2,550	2,460	1,550	1,480	550	470
	5,500	4,810	4,500	4,450	3,500	3,410	2,500	2,410	1,500	1,430	500	420
	5,450	4,810	4,450	4,410	3,450	3,370	2,450	2,390	1,450	1,380	450	370
	5,400	4,810	4,400	4,370	3,400	3,320	2,400	2,350	1,400	1,325	400	330
	5,350	4,810	4,350	4,290	3,350	3,270	2,350	2,280	1,350	1,250	350	270
	5,300	4,810	4,300	4,240	3,300	3,220	2,300	2,230	1,300	1,200	300	220
	5,250	4,810	4,250	4,190	3,250	3,170	2,250	2,170	1,250	1,160	250	150
	5,200	4,810	4,200	4,130	3,200	3,130	2,200	2,120	1,200	1,120	200	90
	5,150	4,810	4,150	4,070	3,150	3,070	2,150	2,070	1,150	1,080	150	60
	5,100	4,810	4,100	4,020	3,100	3,030	2,100	2,030	1,100	1,020	100	20
	5,050	4,810	4,050	3,970	3,050	2,970	2,050	1,980	1,050	970	50	0
											0	0

DATE 5-20-64

BY H. R. Cook

H. R. Cook

TEST DATA SHEET NO. 1

MOTOR OPERATED REGULATOR

3.1 OPERATIONAL TEST (COMPONENT S/N-002)

3.1.3 OPENING CURRENT 250 - 500 M. A. 3.1.4 DOWNSTREAM PRESSURE 5050 PSIG . 3.1.5 PRESSURE CHANGE 90 PSIG .

3.1.6 CLOSING CURRENT 500 - 270 M. A. 3.1.7 DOWNSTREAM PRESSURE (SPECIMEN CLOSED) Zero .

3.1.9 INLET PRESSURE VERSUS OUTLET PRESSURE, PSIG

INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET
3.1.10											
6,000	5,050	5,000	4,930	4,000	3,920	3,000	2,920	2,000	1,950	1,000	930
5,950	5,025	4,950	4,920	3,950	3,870	2,950	2,880	1,950	1,890	950	890
5,900	5,000	4,900	4,920	3,900	3,820	2,900	2,830	1,900	1,840	900	830
5,850	5,000	4,850	4,900	3,850	3,760	2,850	2,780	1,850	1,780	850	780
5,800	5,000	4,800	4,880	3,800	3,710	2,800	2,720	1,800	1,740	800	720
5,750	5,000	4,750	4,880	3,750	3,670	2,750	2,670	1,750	1,690	750	670
5,700	5,000	4,700	4,870	3,700	3,610	2,700	2,630	1,700	1,640	700	630
5,650	5,000	4,650	4,870	3,650	3,520	2,650	2,580	1,650	1,590	650	580
5,600	4,990	4,600	4,860	3,600	3,480	2,600	2,520	1,600	1,540	600	530
5,550	4,990	4,550	4,850	3,550	3,450	2,550	2,480	1,550	1,480	550	470
5,500	4,980	4,500	4,840	3,500	3,420	2,500	2,430	1,500	1,440	500	430
5,450	4,980	4,450	4,840	3,450	3,370	2,450	2,390	1,450	1,380	450	375
5,400	4,975	4,400	4,340	3,400	3,320	2,400	2,350	1,400	1,320	400	330
5,350	4,970	4,350	4,280	3,350	3,260	2,350	2,280	1,350	1,240	350	280
5,300	4,965	4,300	4,230	3,300	3,220	2,300	2,240	1,300	1,200	300	230
5,250	4,960	4,250	4,270	3,250	3,170	2,250	2,190	1,250	1,160	250	150
5,200	4,960	4,200	4,120	3,200	3,130	2,200	2,130	1,200	1,130	200	100
5,150	4,955	4,150	4,060	3,150	3,080	2,150	2,080	1,150	1,090	150	60
5,100	4,945	4,100	4,010	3,100	3,020	2,100	2,040	1,100	1,040	100	20
5,050	4,940	4,050	3,970	3,050	2,970	2,050	2,000	1,050	980	50	0
										0	0

DATE 5-21-64 BY H. R. Cook

H. R. Cook

TEST DATA SHEET NO. 1

MOTOR OPERATED REGULATOR

3.1 OPERATIONAL TEST (COMPONENT S/N-005)

3.1.3 OPENING CURRENT 250 - 500 M.A. 3.1.4 DOWNSTREAM PRESSURE ——— 3.1.5 PRESSURE CHANGE 50

3.1.6 CLOSING CURRENT 500 - 250 M.A. 3.1.7 DOWNSTREAM PRESSURE (SPECIMEN CLOSED) ———

3.1.9 INLET PRESSURE VERSUS OUTLET PRESSURE, PSIG

INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET	INLET	OUTLET
6,000	5,000	5,000	4,900	4,000	3,930	3,000	2,940	2,000	1,940	1,000	960
5,950	5,000	4,950	4,900	3,950	3,900	2,950	2,900	1,950	1,880	950	900
5,900	4,975	4,900	4,830	3,900	3,820	2,900	2,860	1,900	1,840	900	840
5,850	4,950	4,850	4,800	3,850	3,780	2,850	2,800	1,850	1,800	850	800
5,800	4,950	4,800	4,730	3,800	3,720	2,800	2,740	1,800	1,740	800	740
5,750	4,950	4,750	4,700	3,750	3,680	2,750	2,700	1,750	1,700	750	700
5,700	4,950	4,700	4,625	3,700	3,620	2,700	2,640	1,700	1,640	700	640
5,650	4,950	4,650	4,580	3,650	3,540	2,650	2,600	1,650	1,600	650	600
5,600	4,950	4,600	4,520	3,600	3,520	2,600	2,540	1,600	1,580	600	560
5,550	4,950	4,550	4,500	3,550	3,480	2,550	2,500	1,550	1,500	550	500
5,500	4,950	4,500	4,420	3,500	3,440	2,500	2,440	1,500	1,460	500	440
5,450	4,950	4,450	4,400	3,450	3,400	2,450	2,400	1,450	1,400	450	400
5,400	4,950	4,400	4,320	3,400	3,340	2,400	2,360	1,400	1,340	400	340
5,350	4,950	4,350	4,300	3,350	3,300	2,350	2,280	1,350	1,260	350	300
5,300	4,950	4,300	4,220	3,300	3,240	2,300	2,240	1,300	1,220	300	240
5,250	4,950	4,250	4,200	3,250	3,200	2,250	2,200	1,250	1,200	250	140
5,200	4,950	4,200	4,120	3,200	3,140	2,200	2,140	1,200	1,160	200	100
5,150	4,950	4,150	4,030	3,150	3,100	2,150	2,100	1,150	1,100	150	60
5,100	4,950	4,100	4,020	3,100	3,040	2,100	2,040	1,100	1,040	100	25
5,050	4,950	4,050	4,000	3,050	3,000	2,050	2,000	1,050	1,000	50	0
										0	0

3.1.10

DATE 5-28-64 BY H. R. Cook

H. R. Cook

TEST DATA SHEET NO. 1

MOTOR OPERATED REGULATOR (S/N -005)

SUPPLEMENTARY SHEET

High limit switch has been raised to regulate 6000 PSIG for use in test set up. This regulator was used for approximately one month prior to performing this test.

Regulator, S/N -005, was set up for operational test after approximately one month of use and found to regulate erratic. Outlet pressure rises in 100 PSIG surges. Disassembled unit for inspection and found connector stuck in seat retainer. The internal bore which accomodates the connector pin was finished very rough. Spring shows wear marks on both sides of bonnet. The last spiral seems to have drooped enough to let the spring more sideways in the bonnet. The specimen was lubricated and reassembled.

TEST DATA SHEET NO. 2

MOTOR OPERATED REGULATOR

3.1 OPERATIONAL TEST (Cont.) Specimen S/N-001

3.1.15
3.1.17
3.1.19
3.1.20
3.1.21

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	1220	1440
2500	2480	2780
3750	3710	4070
5000	4760	5370

3.1.23 NO. OF CLOCKWISE TURNS 3½ TURNS. Will not hold inlet pressure.

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	*	
2500	*	
3750	*	
5000	*	

3.1.24 NO. OF COUNTER-CLOCKWISE TURNS ---.

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	**	
2500	**	
3750	**	
5000	**	

3.1.28
3.1.31

PRESS. (PSIG)	LEAKAGE	
	INTERNAL	EXTERNAL
1,000	0	0
2,000	0	0
3,000	0	0
4,000	0	0
5,000	0	0
6,000	0	0

* Regulator had to be adjusted back to original setting. Adjustment in clockwise direction causes regulator to vent before it reaches full 5000 PSIG outlet pressure.

** Regulator had to be set back to normal setting. Adjustment in counter clockwise direction causes air to be trapped in regulator and the specimen will not vent to zero PSIG.

DATE 5-20-64 BY H. R. Cook

TEST DATA SHEET NO. 2

MOTOR OPERATED REGULATOR

3.1 OPERATIONAL TEST (Cont.) Specimen S/N-005

3.1.15
3.1.17
3.1.19
3.1.20
3.1.21

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	1230	1520
2500	2460	2830
3750	2640	3990
5000	4920	5350

3.1.23 NO. OF CLOCKWISE TURNS 2 turns.

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	*	
2500	*	
3750	*	
5000	*	

3.1.24 NO. OF COUNTER-CLOCKWISE TURNS ----.

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	**	
2500	**	
3750	**	
5000	**	

3.1.28
3.1.31

PRESS. (PSIG)	LEAKAGE	
	INTERNAL	EXTERNAL
1,000	0	0
2,000	0	0
3,000	0	0
4,000	0	0
5,000	0	0
6,000	0	0

* If relief valve adjustment turned more than 1/8 turn clockwise, specimen ceased functioning properly.

** If relief valve adjustment turned more than 1/4 turn counter clockwise, specimen ceased functioning properly.

DATE 5-21-64 BY H. R. Cook
H. R. Cook

TEST DATA SHEET NO. 2

MOTOR OPERATED REGULATOR

3.1 OPERATIONAL TEST (Cont.) Specimen S/N-005

3.1.15
3.1.17
3.1.19
3.1.20
3.1.21

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	1,200	* 1,365
2500	2,480	2,770
3750	3,680	4,000
4500	4,400	4,710

3.1.23 NO. OF CLOCKWISE TURNS ——— .

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	**	
2500		
3750		
5000		

3.1.24 NO. OF COUNTER-CLOCKWISE TURNS ——— .

DOWNSTREAM PRESS. (PSIG)	PRESSURES ON GAGE NO. 7	
	VALVE NO. 2 OPEN	VALVE NO. 2 CLOSED
1250	***	
2500		
3750		
5000		

3.1.28
3.1.31

PRESS. (PSIG)	LEAKAGE	
	INTERNAL	EXTERNAL
1,000	0	0
2,000	0	0
3,000	0	0
4,000	0	0
5,000	0	0
6,000	0	0

* See Supplementary Sheet

** Over $\frac{1}{4}$ turn in starts a continuous bleed.

*** Over $\frac{1}{4}$ turn out starts trapping air on decrease.

DATE 5-20-64 BY H. R. Cook

H. R. Cook

TEST DATA SHEET NO. 2

MOTOR OPERATED REGULATOR S/N-005

SUPPLEMENTARY SHEET

6/1/64

On operational test, 1250 PSIG regulated outlet pressure, back pressurized regulator to see how much overpressure it would take before relieving. At 1800 PSIG outlet pressure - with regulator set for 1250 PSIG-motor and gear box blew off. Basket nut brackets hung on motor and gear box extracting them when cover came off. Replaced basket nuts and re-wired motor. Adjusted limits and regulator seemed to be working normally.

During the operational test with an outlet pressure of 250 PSIG, the down-stream pressure was raised, from another source to 1800 PSIG. At this pressure, the motor cover and motor blew off. Cover blew off because of pressure build up in motor cover due to excessive leakage out relief valve. Motor and motor cover replaced and limits reset. Regulator operating normally.

TEST DATA SHEET NO. 3

MOTOR OPERATED REGULATOR

3.2 PNEUMATIC PROOF TEST (COMPONENT S/N-001)

3.2.5

PRESSURE (PSIG)	LEAKAGE
2,000	0
4,000	0
6,000	0
8,000	0
10,000	Slight Leak At Bleed (leakage too slight to measure with flowmeter)
12,000	Slight Leak At Bleed (leakage too slight to measure with flowmeter)

3.2.8 EASE OF DISASSEMBLY --- .

3.2.9 CONDITION OF TEST SPECIMEN --- .

3.2.10 PHOTOGRAPH NO. 8 64330 1 DATE 11 August 1964 BY ---- .

3.2.11 EASE OF REASSEMBLY ---- .

DATE 6-1-64 BY T. G. Halbrooks

T. G. Halbrooks

TEST DATA SHEET NO. 3

MOTOR OPERATED REGULATOR

3.2 PNEUMATIC PROOF TEST (Component S/N -002)

3.2.5

PRESSURE (PSIG)	LEAKAGE
2,000	0
4,000	0
6,000	0
8,000	0
10,000	Slight Leak At Vent. (leakage too slight to measure with flowmeter)
12,000	Slight Leak At Vent. (leakage too slight to measure with flowmeter)

3.2.8 EASE OF DISASSEMBLY ———————.

3.2.9 CONDITION OF TEST SPECIMEN ———————.

3.2.10 PHOTOGRAPH NO. ——— DATE ——— BY ———.

3.2.11 EASE OF REASSEMBLY ———————.

DATE 6-1-64 BY T. G. Halbrooks

TEST DATA SHEET NO. 3

MOTOR OPERATED REGULATOR

3.2 PNEUMATIC PROOF TEST (COMPONENT S/N-005)

3.2.5

PRESSURE (PSIG)	LEAKAGE
2,000	0
4,000	0
6,000	0
8,000	0
10,000	0
12,000	0

3.2.8 EASE OF DISASSEMBLY ——————.

3.2.9 CONDITION OF TEST SPECIMEN ——————.

3.2.10 PHOTOGRAPH NO. —————— DATE —————— BY ——————.

3.2.11 EASE OF REASSEMBLY ——————.

DATE 6-1-64 BY T. G. Halbrooks

T. G. Halbrooks

TEST DATA SHEET NO. 4

MOTOR OPERATED REGULATOR

3.3 PNEUMATIC FLOW TEST (COMPONENT S/N-001)

3.3.2
3.3.6
3.3.7

RUN NUMBER	INLET REGULATOR PRESSURE (PSIG)	EVENT NUMBER
1	6,000	97
2	6,000	98
3	6,000	99
4	6,000	100
5	6,000	101
6	6,000	102
7	6,000	103
8	6,000	104
9	6,000	105

DATE 7-19-64

BY W. R. Cook
H. R. Cook

TEST DATA SHEET NO. 5

MOTOR OPERATED REGULATOR

3.4 PNEUMATIC CYCLE TEST (COMPONENT S/N 005)

3.4.4
3.4.6
3.4.7
3.4.8

CYCLE NUMBER	OPENING CURRENT	PRESSURES (PSIG)		SPECIMEN (TEMP °F)	LEAKAGE	
		UPSTREAM	DOWNSTREAM		INTERNAL	EXTERNAL
0	440 M.A.	6000	5200	88°	0	0
200	430 M.A.	6000	5000	106°	0	0
400	390 M.A.	6000	5000	107°	0	0
600	390 M.A.	6000	5000	102°	0	0
800	420 M.A.	6000	5000	103°	0	0
1,000	410 M.A.	6000	5000	99°	0	0

NOTE: 1. Prior to cycle test, regulator was disassembled and the adjusting screw, bearing and bearing cap were lubricated with DC-55 (6/8/64)

2. After 285 cycles regulator was drawing 470 M.A. Disassembled, inspected and lubricated. The back up ring in the sensor had extruded. Removed feathered edge and reassembled. Regulator drew 345 M.A. after lubrication.

DATE_____

BY T G Halbrooks
T. G. Halbrooks

TEST DATA SHEET NO. 5

MOTOR OPERATED REGULATOR

3.4 PNEUMATIC CYCLE TEST (COMPONENT S/N-001)

3.4.4 3.4.6 3.4.7 3.4.8 CYCLE NUMBER	OPENING CURRENT	PRESSURE (PSIG)		SPECIMEN'S TEMP. (°F)	LEAKAGE	
		UPSTREAM	DOWNSTREAM		INTERNAL	EXTERNAL
0	450 M.A.	6,000	5,300	87°	0	0
* 200	400 M.A.	6,000	5,000	103°	0	0
400	450 M.A.	6,000	5,000	108°	0	0
600	430 M.A.	6,000	5,000	104°	0	0
800	420 M.A.	6,000	5,000	100°	0	0
** 1,000	430 M.A.	6,000	5,000	103°	0	0

* See Note 2, Page B45

** See Note 3, Page B45

DATE 6-18-64 BY T. G. Halbrooks

TEST DATA SHEET NO. 5

MOTOR OPERATED REGULATOR (S/N-001)

SUPPLEMENTARY SHEET

NOTE:

1. Disassembled Regulator, lubricated thrust bearing, stem, and bearing cap. 6/9/64

2. After 187 cycles operational current was 490 M.A., Disassembled and lubricated. Operational current now 380 M.A. 6/11/64

3. After 928 cycles operational current 530 M.A. Disassembled and found bearing and upper end of adjusting stem to be dry of lubrication. The bearing and adjusting screw were galled. Lubricated where needed. Regulator operational current was 420 M.A. after lubrication. 6/17/64

TEST DATA SHEET NO. 5

MOTOR OPERATED REGULATOR

3.4 PNEUMATIC CYCLE TEST (COMPONENT S/N-002)

3.4.4
3.4.6
3.4.7
3.4.8

CYCLE NUMBER	OPENING CURRENT	PRESSURES (PSIG)		SPECIMEN'S TEMP.(°F)	LEAKAGE	
		UPSTREAM	DOWNSTREAM		INTERNAL	EXTERNAL
0	480 MA.	6,000	5,000	+86	0	0
200	*500 MA.	6,000	5,000	+87	0	0
400	**445 MA.	6,000	5,000	+88	0	0
600	480 MA.	6,000	5,000	+87	0	0
800	****500 MA.	6,000	5,000	+87	0	0
1,000	520 MA.	6,000	5,000	81	Reg. closed 15 SCIPM Leakage	0

* See following page.
** See following page.
*** See following page.
**** See following page.

DATE 6-8-64

BY T. G. Halbrooks

T. G. Halbrooks

TEST DATA SHEET NO. 5

MOTOR OPERATED REGULATOR (S/N-002)

SUPPLEMENTARY SHEET

* After 164 Cycles regulator was making a whinning noise. Disassembled and lubricated gears, spring and screw shaft. Noise stopped, now ok.

** After 310 cycles regulator required 800 MA. to open. Removed motor from regulator and motor required 150 MA.; spring was bent. Lubricated spring and adjusting screw. Spring seemed to be rubbing side of housing. Also lubricated limit screw, reinstalled in regulator and regulator required 580 MA to open.

*** After 348 Cycles, regulator "locked up" on the decrease cycle. Motor required 1.5 Amps and fuse blew. Disassembled and found the adjusting screw to be galled in the bearing cap. The thrust bearing was damaged.

Removed bearing from S/N-005 (after cycle test) and installed in S/N-002.

**** At 728 cycles regulator required 500 M.A. for operation. Removed regulator and disassembled. Lubricated adjusting stem & bearing.

TEST DATA SHEET NO. 6

MOTOR OPERATED REGULATOR

3.5 PNEUMATIC SURGE TEST (COMPONENT S/N-001)

3.5.6 3.5.7	PRESSURE (PSIG)	EVENT NO.	LEAKAGE		PRESSURES (PSIG)		SPECIMEN TEMP. (°F)	PEAK SURGE PRESS., PSI
			INTERNAL	EXTERNAL	UPSTREAM	DOWNSTREAM		
3.5.10	2,000	151	0	0	2,000	2,000	90°F	2150
3.5.13	3,000	152	0	0	3,000	2,975	92°F	3450
	4,000	153	0	0	4,000	3,950	94°F	4650
	5,000	154	0	0	5,000	4,900	96°F	5550
	6,000	155	0	0	6,000	4,900	96°F	6900

DATE 6-22-64 BY H.R. Cook

H. R. Cook

TEST DATA SHEET NO. 6

MOTOR OPERATED REGULATOR

3.5 PNEUMATIC SURGE TEST (COMPONENT S/N-002)

3.5.6 3.5.7	PRESSURE (PSIG)	EVENT NO.	LEAKAGE		PRESSURES (PSIG)		SPECIMEN TEMP. (°F)	PEAK SURGE PRESSURE, PSI
			INTERNAL	EXTERNAL	UPSTREAM	DOWNSTREAM		
3.5.10	2,000	151	0	0	2000	2000	AMBIENT	2150
3.5.13	3,000	152	0	0	3000	3000	"	3300
	4,000	153	0	0	4000	4000	"	4400
	5,000	154	0	0	5000	5000	"	5500
	6,000	155	0	0	6000	5100	"	6650

DATE 6-19-64 BY T. G. Halbrooks

T. G. Halbrooks

TEST DATA SHEET NO. 6

MOTOR OPERATED REGULATOR

3.5 PNEUMATIC SURGE TEST (COMPONENT S/N-005)

3.5.6 3.5.7	PRESSURE (PSIG)	EVENT NO.	LEAKAGE		PRESSURES (PSIG)		SPECIMEN TEMP. (°F)	PEAK SURGE PRESS. PSIG
			INTERNAL	EXTERNAL	UPSTREAM	DOWNSTREAM		
3.5.10	2,000	151	0	0	2000	2000	Ambient	2100
3.5.13	3,000	152	0	0	3000	3000	Ambient	3300
	4,000	153	0	0	4000	4000	Ambient	4650
	5,000	154	0	0	5000	5000	Ambient	5750
	6,000	155	0	0	6000	6000	Ambient	6900

DATE 6-19-64 BY T. G. Halbrooks

TEST DATA SHEET NO. 7

MOTOR OPERATED REGULATOR

3.6 TEMPERATURE SUSCEPTIBILITY TEST (COMPONENT S/N-001)

3.6.9
3.6.10

COLD TEMPERATURE				
PRESSURE (PSIG)	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
2,000	-60°	-60°	0	0
3,000	-60°	-60°	0	0
4,000	-60°	-60°	0	0
5,000	-60°	-60°	*	0
6,000	-60°	-60°	**	0

3.6.21

HOT TEMPERATURE				
PRESSURE (PSIG)	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
2,000	160°	160°	0	0
3,000	165°	165°	0	0
4,000	165°	165°	0	0
5,000	165°	165°	0	0
6,000	165°	165°	0	0

3.6.12

CHAMBER TEMPERATURE	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
COLD	-60°	-60°	Leakage as above	0
HOT	165°	165°	0	0

* Opened and closed regulator and leak stopped.

** Operated specimen and outlet pressure increased to 6000 PSIG (set at 5000 PSIG)

DATE 5-25-64

BY H. R. Cook
H. R. Cook

TEST DATA SHEET NO. 7

MOTOR OPERATED REGULATOR

3.6 TEMPERATURE SUSCEPTIBILITY TEST (COMPONENT S/N-002)

3.6.9
3.6.10

COLD TEMPERATURE				
PRESSURE (PSIG)	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
2,000 *	-60°	-60°	0	0
3,000	-60°	-60°	0	0
4,000	-60°	-60°	0	0
5,000	-60°	-60°	** 0	0
6,000	-60°	-60°	Leaking @ 5900	0

3.6.21

HOT TEMPERATURE				
PRESSURE (PSIG)	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
2,000	165°	165°	0	0
3,000	165°	165°	0	0
4,000	165°	165°	0	0
5,000	165°	165°	0	0
6,000	165°	165°	0	0

3.6.12
3.6.21

CHAMBER TEMPERATURE	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
COLD	60°	60°	Leak rate same	0
HOT	165°	165°	0	0

* See following page.
** See following page.

DATE 5-21-64

BY H. R. Cook
H. R. Cook

TEST DATA SHEET NO. 7

MOTOR OPERATED REGULATOR (S/N -002)

SUPPLEMENTARY SHEET

5/22/64

* Regulator would not operate properly during cold (-60°F) test. Disassembled regulator and found spring bent and stuck in bonnet. Connector pin was stuck in inlet seat retainer plug. Reassembled regulator using new spring and seat retainer plug.

** Steady stream of small bubbles escaped at a leak rate which was too fast to count. However, leakage rate could not be detected with a 0-13 SCIM range Vol-o-Flow flowmeter.

TEST DATA SHEET NO. 7

MOTOR OPERATED REGULATOR

3.6 TEMPERATURE SUSCEPTIBILITY TEST (COMPONENT S/N-005)

3.6.9
3.6.10

COLD TEMPERATURE				
PRESSURE (PSIG)	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
2,000	-60°	-60°	0	0
3,000	-60°	-60°	0	0
4,000	-60°	-60°	0	0
5,000	-60°	-60°	0	0
6,000	-60°	-60°	0	0

3.6.21

HOT TEMPERATURE				
PRESSURE (PSIG)	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
2,000	165	165	0	0
3,000	165	165	0	0
4,000	165	165	0	0
5,000	165	165	0	0
6,000	165	165	0	0

3.6.12
3.6.21

CHAMBER TEMPERATURE	TEMPERATURES (°F)		LEAKAGE	
	SPECIMEN	CHAMBER	INTERNAL	EXTERNAL
COLD	-60°	-60°	0	0
HOT	165	165	0	0

DATE 6-3-64

BY H. R. Cook

H. R. Cook

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